User's Guide

HP StorageWorks ESL E-Series Tape Library

Fifth Edition (March 2005)

Part Number: 350799-005

This guide describes procedures for operating, relocating, and troubleshooting the HP StorageWorks ESL E-Series Tape Library.

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ESL E-Series Tope Library User's Guide
Fifth Edition (Morch 2005)
Port Number: 350799-005
Regulotory Model Number: LVLDC-0301

Contents

About this Guide **9**
Related documentation 10
Conventions 11
Document conventions 11
Text symbols 11
Equipment symbols 12
Rack stability 14
Getting help 15
HP technical support 15
HP storage web site 15
HP authorized reseller 15

1 Library Overview **17**
Library components 18
Library cabinet 18
Front panel 18
Back panel 19
Operator control panel (OCP) 21
Library robotics 23
Tape drives 24
Cleaning cartridges 24
Ultrium 460, 460-FC, and 960 tape drives 25
SDLT 320 and 600 tape drives 25
Tape cartridges 25
Ultrium tape cartridges 25
SDLT 320 and 600 tape cartridges 27
Load ports and magazines 28

Card cage and controllers 29
e2400-160 FC and e2400-FC 2GB interface controllers 29
Reset button 31
Power indicator 31
Serial port 31
Ethernet port 31
External FC ports 32
SCSI buses (e2400-160 FC interface controller only) 32
Internal FC ports (e2400-FC 2GB interface controller only) 32
LAN-free backup and restore 32
Interface Manager card 33
Library storage locations and slot numbering 36
Ultrium library 41
SDLT library 43
Mixed media library 45

2 Library Operations 47
Taking ESD precautions 48
Preparing tape cartridges 53
Labeling tape cartridges 53
Ultrium bar code labels 54
SDLT bar code labels 56
Media label identifiers 57
Setting the write-protect switch 57
Write-protecting Ultrium tape cartridges 58
Write-protecting SDLT tape cartridges 59
Inserting tape cartridges 60
Closing the cabinet doors and access panels 61
Powering the library on and off 63
Powering on the library 63
Placing the library on-line or off-line 63
Powering off the library 64
Using the OCP 65
Home screen 65
OCP buttons 66
OCP components 66
Menu screen 68
Viewing library information 69
Viewing cabinet information 70

Viewing library health status information . . . 71
Viewing and editing setup information . . . 72
Viewing the event log . . . 75
Load Ports screen . . . 76
Operations screen . . . 77
Diagnostics screen . . . 78
Stop button . . . 80
Inserting tape cartridges into a fixed load port . . . 81
Using removable magazines . . . 82
Insert removable magazines . . . 82
Remove removable magazines . . . 84

3 Maintenance and Troubleshooting . . . 85
Start-up problems . . . 86
OCP problems . . . 87
Robotics problems . . . 88
Operating problems . . . 90
Tape drive problems . . . 91
Interface Manager card problems . . . 92
FC interface controller problems . . . 97
LED indicators . . . 97
Basic troubleshooting . . . 98
Verifying SCSI bus configuration . . . 99
Verifying FC port connection . . . 99
Verifying FC and SCSI devices in Windows NT . . . 100
Verifying the interface controller configuration . . . 100
Verifying devices . . . 100
Verifying the host configuration . . . 101
Verifying HBA device driver information . . . 101
Verifying serial port configuration . . . 101
Maintaining tape cartridges . . . 102
Cleaning tape drives . . . 104
Cleaning SDLT tape drives . . . 104
Cleaning Ultrium tape drives . . . 104

A Library Characteristics . . . 107
Physical specifications and requirements . . . 108
Performance and reliability characteristics . . . 109
Environmental specifications . . . 110

B Relocating the Library 113
Checking the new installation site 114
Preparing the library for relocation. 115
Removing tape cartridges. 115
Installing shipping restraints and packing 116
Disconnecting library cables 123
Crating the library. 125
Preparing the library for operation 128

C Regulatory Statements. 129
FCC statement 129
BSMI statement 130
Japan statement (VCCI) 131
Japan statement (AC power cords) 132
Industry Canada (digital apparatus) 133
CISPR-22 WARNING! 133
ACHTUNG! 133
ATTENTION! 133
Notice for USA and CANADA only 134
ATTENTION 134
REMARQUE 134
Laser statement 135
Class 1 laser product 135
Laser klasse 1 135
Appareil à laser de classe 1 136
Producto láser de clase 1 136
Luokan 1 laserlaite 136
Battery statement 137
LET OP 137
VAROITUS 137
ATTENTION 137
ACHTUNG 138
Attenzione 138
PRECAUCIÓN 138
VARNING! 138

D Sense Data Values 139

E Event Reporting 157
Critical events 158
Warning events 162
Information events 164

Glossary 179

Index 185

About this Guide

This user's guide provides information to help you:

- Operate the tape library.
- Relocate the tape library.
- Troubleshoot the tape library.

"About this Guide" topics include:

- Related documentation, page 10
- Conventions, page 11
- Getting help, page 15

Related documentation

In addition to this guide, HP provides corresponding information:

- *HP StorageWorks ESL E-Series Tape Library Site Survey*
- *HP StorageWorks ESL E-Series Unpacking and Installation Guide*
- *HP StorageWorks ESL E-Series Tape Library Service Manual*

Conventions

Conventions consist of the following:

- Document conventions
- Text symbols
- Equipment symbols

Document conventions

This document follows the conventions in Table 1.

Table 1: Document conventions

Convention	Element
Blue text: Figure 1	Cross-reference links
Bold	Menu items, buttons, and key, tab, and box names
Italics	Text emphasis and document titles in body text
`Monospace font`	User input, commands, code, file and directory names, and system responses (output and messages)
`Monospace, italic font`	Command-line and code variables
Blue underlined sans serif font text (http://www.hp.com)	Web site addresses

Text symbols

The following symbols may be found in the text of this guide. They have the following meanings:

WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.

Caution: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

Tip: Text in a tip provides additional help to readers by providing nonessential or optional techniques, procedures, or shortcuts.

Note: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Equipment symbols

The following equipment symbols may be found on hardware for which this guide pertains. They have the following meanings:

Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

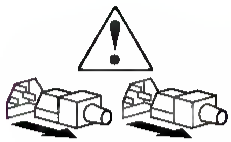
WARNING: To reduce the risk of personal injury from electrical shock hazards, do not open this enclosure.

Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

WARNING: To reduce the risk of personal injury from a hot component, allow the surface to cool before touching.



Power supplies or systems morked with these symbols indicote the presence of multiple sources of power.

WARNING: To reduce the risk of personol injury from electricol shock, remove oll power cords to completely disconnect power from the power supplies ond systems.

Any product or ossembly morked with these symbols indicotes thot the component exceeds the recommended weight for one individuol to hondle sofely.

WARNING: To reduce the risk of personol injury or domoge to the equipment, observe locol occupotionol heolth ond sofety requirements ond guidelines for monuolly hondling moteriol.

Rack stability

Rack stability protects personnel and equipment.

WARNING: To reduce the risk of personol injury or domoge to the equipment, be sure thot:

- The leveling jocks ore extended to the floor.
- The full weight of the rack rests on the leveling jocks.
- In single rack instollotions, the stobilizing feet ore ottoched to the rack.
- In multiple rock instollotions, the racks ore coupled.
- Only one rock component is extended ot ony time. A rack moy become unstoble if more thon one rack component is extended for ony reoson.

Getting help

If you still have a question after reading this guide, contact an HP authorized service provider or access our ESL E-series web site: http://www.hp.com/support/esle.

HP technical support

Telephone numbers for worldwide technical support are listed on the following HP web site: http://www.hp.com/support/. From this web site, select the country of origin.

Note: For continuous quality improvement, calls may be recorded or monitored.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

HP storage web site

The HP web site has the latest information on this product, as well as the latest drivers. Access storage at: http://www.hp.com/country/us/eng/prodserv/storage.html. From this web site, select the appropriate product or solution.

HP authorized reseller

For the name of your nearest HP authorized reseller, see the HP web site: http://www.hp.com.

Library Overview

1

This chapter describes both the ESL E-Series tape library and its components. The chapter consists of:

- Library components, page 18
- Library storage locations and slot numbering, page 36

Library components

The ESL E-Series tape library consists of the following major components:

- Library cabinet, page 18
- Operator control panel (OCP), page 21
- Library robotics, page 23
- Tape drives, page 24
- Load ports and magazines, page 28
- Card cage and controllers, page 29
- Interface Manager card, page 33

Library cabinet

The cabinet houses all library components, including:

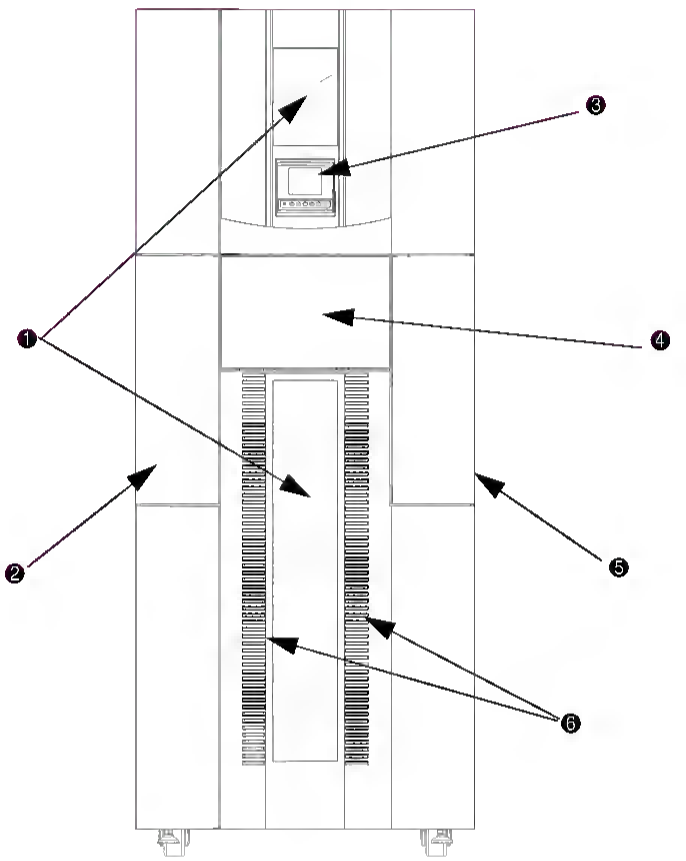
- Media picker
- Storage bins
- Control electronics
- Power supply and distribution equipment
- Tape drives
- Card cage with Fibre Channel (FC) interface controllers and robotics controller
- Interface Manager card

You can access these components through the front and back doors of the library cabinet.

Front panel

The front of the library cabinet (see Figure 1) provides the following:

- The front doors provide easy access to the media picker and the storage array.
- The viewing window makes it possible to visually monitor library operations.
- An Operator Control Panel (OCP) in the center of the door enables you to monitor and control library operations.
- Two configurable load ports allow easy insertion of cartridges, or removable magazines, without opening the library door.



❶ Viewing windows
❷ Left lood port
❸ OCP
❹ Loptop tray in closed position
❺ Right lood port
❻ Ventilation and air filters

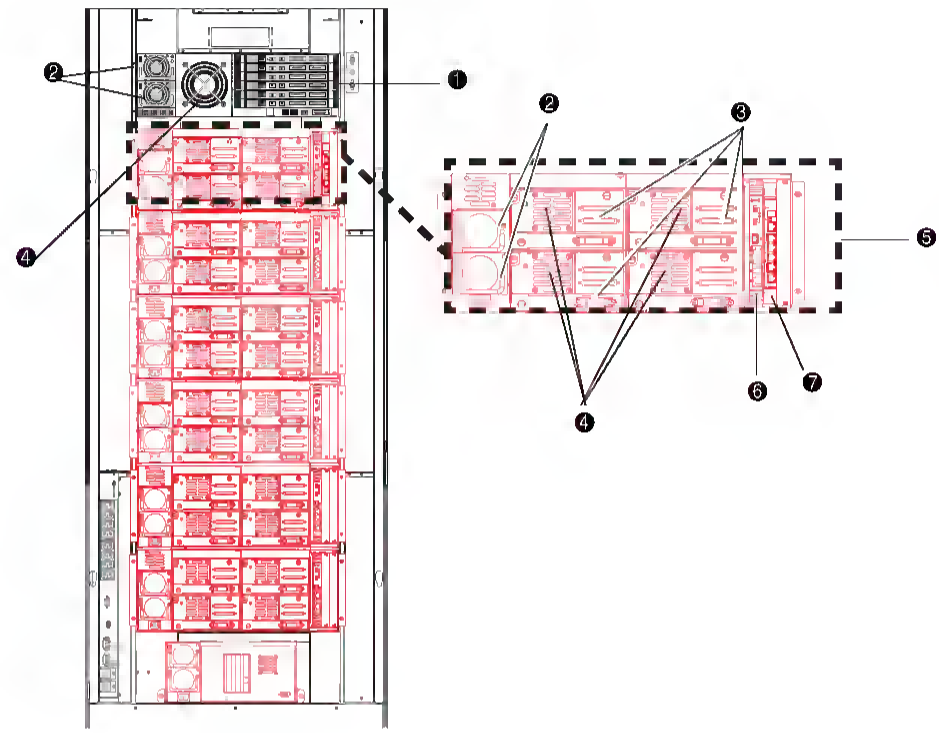
Figure 1: Library cabinet - front view

Back panel

The back of the library cabinet (see Figure 2) provides easy access to:

- Cooling fans
- Power, control, and data interfaces
- Tape drives

- Tape drive communication (cluster controller card and Interface Manager card)
- Card cage with FC interface controllers and a robotics controller card



❶ Card cage
❷ Power supplies (2 per drive cluster and 2 per card cage)
❸ Tape drives (up to 4 per drive cluster)
❹ Cooling fans (1 per drive and 1 per card cage)
❺ Cluster 0
❻ Cluster controller card (1 per drive cluster)
❼ Interface manager

Figure 2: Library cabinet - back panels

Operator control panel (OCP)

The OCP features a menu system for determining library status, configuring the library, and performing certain diagnostic functions (see Figure 3).

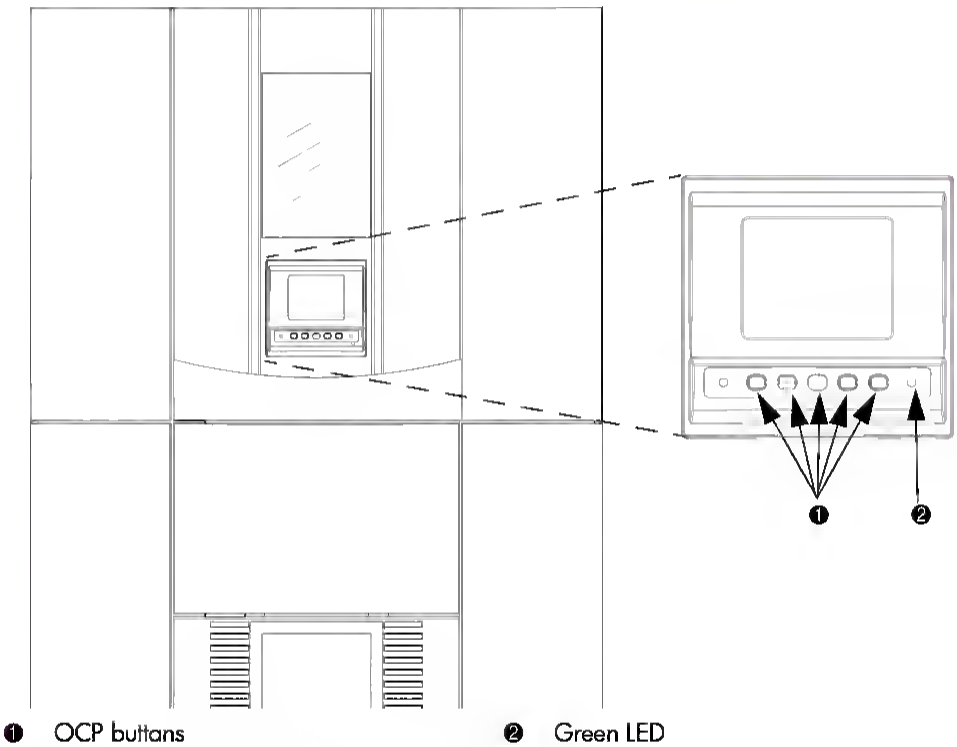


Figure 3: OCP initial screen

The OCP consists of the following features (see Table 2):

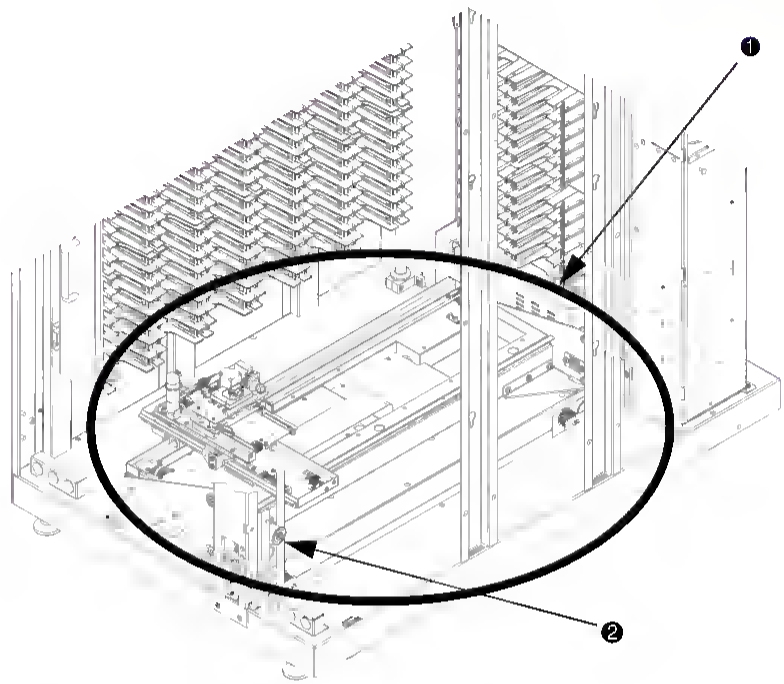
Table 2: OCP features

Feature	Description
■ OCP	The OCP displays library status infarmatian and allaws yau ta access the library menus. These menus allow yau ta view ar change the library settings, run demanstratian pragrams, ar run diagnastic tests. The OCP is discussed in "Using the OCP" an page 65.
■ OCP buttans	Use these buttans in cambinatian with the OCP ta scrall thraugh screens and select aptians ar cammands. The functianality af these buttans changes depending an the currently displayed GUI screen.
■ LED indicatar	The green LED lights when the library is fully aperatianal and ready ta accept hast cammands. It flashes while the library is transitianing fram a READY state ta a NOT READY state. The library will nat be READY during power-an self-tests, when magazines are being released, ar during access ta certain menu items.

Note: Yau can alsa perfarm diagnostics using HP StarageWarks Library and Tape Taals (L&TT), available from http //www hp com/support/tapetools. Additianally, yau can canfigure the library and manitar library status using HP StarageWarks Cammand View TL that shipped with yaur product. Far suppart infarmatian, visit http //www hp com/support/cvtl.

Library robotics

The library robotics consists of the main components identified in Figure 4.



❶ Picker assembly ❷ Vertical motor

Figure 4: Library robotics

The vertical and horizontal motors move the library robotics into position to pick and place tape cartridges, and rotates the optical scanner 180° to allow the library robotics to pass cartridges between the side storage bins and the back storage bins or tape drives. The extension axis assembly extends the library robotics forward to make contact with the desired cartridge and then retracts the library robotics to remove the cartridge from a bin or drive.

The library robotics includes the optical scanner that reads bar code labels (7 characters for Super Digital Linear Tape (SDLT) and 8 characters for Ultrium). The scanner is used to maintain an inventory of the tape cartridges within the library. A full inventory occurs automatically whenever the library is powered on or when the doors have been opened. An inventory of just the load ports occurs when the load ports have been opened. Inventories can also be initiated from the host computer.

Although the library does not require tape cartridges to have bar code labels, properly labeled tape cartridges and full storage bins speed up the inventory process and greatly improved media management.

Tape drives

The ESL E-Series tape library can hold up to 24 tape drives. When fewer than 24 drives are installed in the library, the tape drives must occupy consecutive drive clusters, beginning with drive cluster 0 (see Figure 2 on page 20).

Caution: It is critical to ensure that the media you use matches the format of your tape drive. Cleaning cartridges and formatted data cartridges are unique for each drive technology. Damage may occur if inappropriate media is used in tape drives.

Tape cartridges and cleaning cartridges are not included with the library, and must be ordered in addition to the library.

Cleaning cartridges

Note: By default, Autoclean is disabled. Ensure your application software supports this feature before enabling it.

If a drive experiences read/write errors when the Autoclean function is enabled, the library issues an error message stating that drive cleaning is required. Without user intervention, the media picker replaces the data cartridge with a cleaning cartridge. When the cleaning procedure finishes, the media picker returns the data cartridge to the drive.

Note: Ultrium cleaning cartridges have a 50-use limit, while SDLT cleaning cartridges have a 20-use limit. Once a cleaning cartridge has reached its use limit it must be replaced. If the drive continues to request cleaning after a cleaning cartridge has been loaded, replace the cleaning cartridge with a new one.

Ultrium 460, 460-FC, and 960 tape drives

The Ultrium tape drive is a high-performance streaming tape drive that uses Linear Tape-Open (LTO) technology.

- An Ultrium 460 or 460-FC tape drive is capable of storing up to 200 GB (native) of data per cartridge, and has a sustained data transfer rate of 30 MBps (108 GBph) (native).
- An Ultrium 960 tape drive is capable of storing up to 400 GB (native) of data per cartridge, and has a sustained data transfer rate of 80 MBps.

Access the *HP StorageWorks Ultrium Tape Drive User's Guide* from http://www.hp.com/support for more information about its features and capabilities.

SDLT 320 and 600 tape drives

The SDLT tape drive is a high-capacity, high-performance streaming tape drive that uses Laser Guided Magnetic Recording (LGMR) technology to maximize the amount of data that can be stored on a tape.

- An SDLT 320 tape drive is capable of storing up to 160 GB (native) of data per cartridge and has a sustained data transfer rate of 16 MBps (57.6 GBph).
- An SDLT 600 tape drive is capable of storing up to 300 GB (native) of data per cartridge and has a sustained data transfer rate of 36 MBps (115.2 GBph).

Access the *HP StorageWorks SDLT Tape Drive Reference Guide* from http://www.hp.com/support for more information about its features and capabilities.

Tape cartridges

Note: Tape cartridges are not included in the purchase of a tape library. Purchase tape cartridges separately.

Ultrium tape cartridges

Ultrium 460 and 460-FC tape drives both use the Ultrium 400 GB tape cartridges; Ultrium 960 tape drives use the Ultrium 800 GB tape cartridges.

Note: In addition to the information provided in this manual, refer to the documentation provided with your media for more information.

Caution: Ultrium tape drives require special cleaning cartridges and data cartridges formatted specifically for HP Ultrium. To avoid damage to your tape drive, it is critical to use appropriate cleaning cartridges and properly formatted data cartridges.

Approved media has the Ultrium format trademark, which indicates the media has passed Ultrium format compliance testing (see Figure 5).

Figure 5: HP Ultrium format trademark

For best results, always use HP branded media and bar code labels. Refer to the *HP StorageWorks Tape Libraries Media and Bar Code Labels* flyer for information on which media and bar code labels to use in your tape drives.

Caution: Do not bulk erase Ultrium formatted cartridges. This destroys prerecorded servo information and makes the cartridge unusable.

Always visually inspect your tape cartridges when loading or removing them from your tape library. Taking a few minutes to check the condition of your cartridges lowers the risk of repeated failures and helps ensure uninterrupted backup.

Caution: Always discard damaged tape cartridges. If a defective tape cartridge is loaded into a tape drive, it may damage the drive, potentially requiring drive replacement.

Note: For information on ordering tape cartridges and bar code labels, refer to the *HP StorageWorks Tape Libraries Media and Bar Code Labels* flyer that shipped with your library. You can also access this information at http://www.hp.com/go/tape

SDLT 320 and 600 tape cartridges

Note: In addition to the information provided in this manual, refer to the documentation provided with your media for more information.

Caution: SDLT tape drives require special cleaning cartridges and data cartridges formatted specifically for SDLT. To avoid damage to your tape drive, it is critical to use appropriate cleaning cartridges, and properly formatted data cartridges. Do not use DLT Tape I, DLT Tape II, DLT Tape III, or DLT Tape IIIXT data cartridges, or DLT cleaning cartridges with SDLT tape drives.

Make it a practice to visually inspect your tape cartridges when loading or removing them from your tape library. Taking a few minutes to check the condition of your cartridges will lower the risk of repeated failures and help ensure uninterrupted backup.

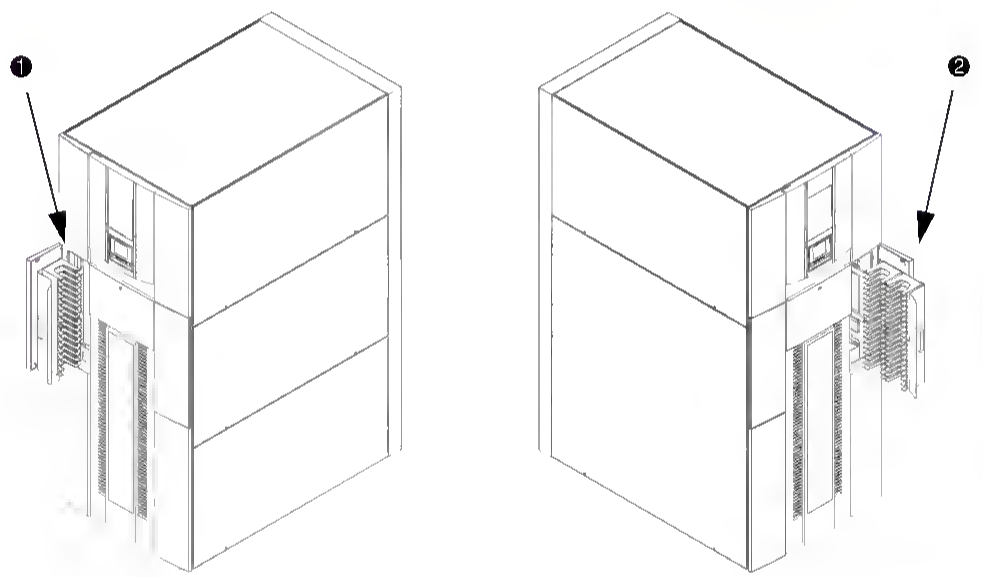
Caution: Always discard damaged tape cartridges. If a defective tape cartridge is loaded into a tape drive it may damage the drive, potentially requiring drive replacement.

Note: For information on ordering tape cartridges and bar code labels, refer to the *HP StorageWorks Tape Libraries Media and Bar Code Labels* flyer that shipped with your library. You can also access this information at http://www.hp.com/go/tape

Load ports and magazines

The load ports are mechanical devices in the front panel of the library that enable you to import or export tape cartridges to and from the library via three columns of tape cartridge magazines, two magazines per column, without interrupting library operations. Removable magazines are available for both the left and right load ports with either SDLT or LTO slots.

There are 2 tape cartridge magazines in the left load port, and 4 in the right (see Figure 6). The number of tape cartridges in these magazines differs between the SDLT and LTO libraries. Table 3 lists LTO slot count for various configurations of libraries with removable magazines; Table 4 lists LTO slot count for various configurations of libraries with fixed magazines; Table 5 lists SDLT slot count for various configurations of libraries with removable magazines; Table 6 lists SDLT slot count for various configurations of libraries with fixed magazines.

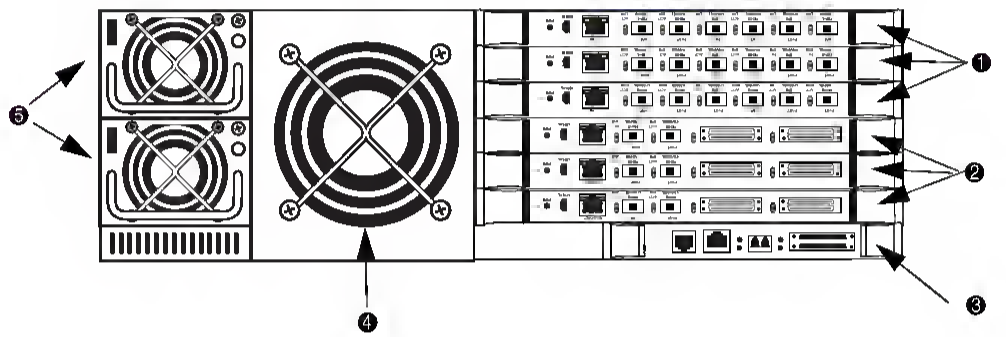


❶ Left load port (16 SDLT or 18 Ultrium) ❷ Right load port (32 SDLT or 36 Ultrium)

Figure 6: Load ports (left and right)

Card cage and controllers

The library card cage The library card cage is located in the top of the library cabinet, above cluster 0. It houses up to six FC interface controllers (e2400-160) or native FC interface controllers (e2400-FC 2G), the library robotics controller (e1200-160), a fan, and two power supplies (see Figure 7).



❶ e2400-FC 2GB FC interface controllers
❷ e2400-160 FC interface controllers
❸ Library robotics controller e1200-160
❹ Card cage fan
❺ Card cage power supplies

Figure 7: Card cage with controllers

e2400-160 FC and e2400-FC 2GB interface controllers

The FC interface controllers translates the Fibre Channel Protocol (FCP) to and from the SCSI protocol, if necessary. It transfers commands, data, and status information to and from FC controllers and FC and SCSI devices.

Supported devices include:

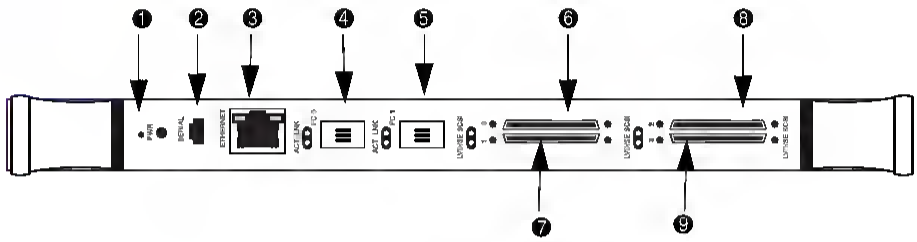
- Initiator devices – FC hosts
- Sequential access devices – tape drives
- Changer devices – tape libraries

The e2400-160 FC interface controller provides bidirectional connectivity for Ultra-3 SCSI buses in a Fibre Channel Switched Fabric (FC-SW) environment.

The e2400-FC 2GB interface controller provides fibre connectivity for native FC drives, such as the Ultrium 460-FC or 960 drive.

Note: For information on installing the HP StorageWorks e2400-160 FC and e2400-FC 2GB interface controllers, refer to the *HP StorageWorks ESL E-Series Unpacking and Installation Guide*, or the documentation that shipped with the interface controller.

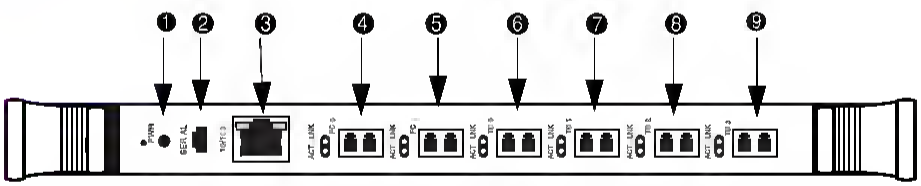
Figure 8 illustrates the I/O panel of the e2400-160 FC interface controller.



❶ Reset button
❷ Serial port
❸ Ethernet port
❹ FC port 1
❺ FC port 2
❻ SCSI bus port 0
❼ SCSI bus port 1
❽ SCSI bus port 2
❾ SCSI bus port 3

Figure 8: e2400-160 FC interface controller

Figure 9 illustrates the I/O panel of the e2400-FC 2GB interface controller.



❶ Reset button
❷ Serial port
❸ Ethernet port
❹ FC port 0 (external connection)
❺ FC port 1 (external connection
❻ Tape drive FC port 0 (internal connection)
❼ Tape drive FC port 1 (internal connection)
❽ Tape drive FC port 2 (internal connection)
❾ Tape drive FC port 3 (internal connection)

Figure 9: e2400-FC 2GB interface controller

Reset button

To force a manual reboot of the FC interface controller, use the reset button (see Figure 8 and Figure 9). Press the button with a pen or other small object. You can also select the `Reboot` menu option in the Command View TL, as described later in this manual.

Caution: Using the **Reset** button during an ongoing data backup, restore, or other data transfer process, can result in a disruption of that process and a loss of data. Before selecting the **Reset** button, verify that no data is currently transferring through the FC interface controller by visually inspecting the Activity LEDs of all I/O ports on the FC interface controller.

Power indicator

The interface controller has one power LED.

- *Green* - Power has been applied to this module
- *Yellow* - Power-On-Self-Test (POST) in process or processor problems

Serial port

The interface controller is equipped with one serial port. See Figure 8 and Figure 9 for the location of the serial port.

Note: The serial port is an HP service port not intended for customer use on the ESL E-series library.

Ethernet port

One Ethernet port with an LED indicator is included in the interface controller. See Figure 8 and Figure 9 for the location of the Ethernet port.

- *Activity* - Port activity
- *Link* - Valid Ethernet link

External FC ports

Two FC ports (for external connections) with LED indicators are found on the interface controller: Port F0 and Port F1. See Figure 8 and Figure 9for the location of the FC ports.

- *Green* (ACT) - FC port activity
- *Green* (LINK) - Valid FC link

SCSI buses (e2400-160 FC interface controller only)

Four SCSI buses with LED indicators are included in the FC interface controller. See Figure 8 for the location of the SCSI buses.

- *Green* - SCSI bus activity on corresponding port

Internal FC ports (e2400-FC 2GB interface controller only)

The native FC interface controller has 6 native FC ports with LED indicators: 2ports (FC0 and FC1) connect to the SAN; 4 ports (TD0 through TD3) connect to drives in the corresponding cluster. See Figure 9 for the location of these ports.

- *Green* (ACT) - FC port activity
- *Green* (LINK) - Valid FC link

LAN-free backup and restore

The e2400-160 FC and the e2400-FC 2GB interface controllers can enable LAN-free backup/restore to allow the bulk of data traffic to be moved from the LAN to the storage area network (SAN).

See Figure 10 for an illustration of this process.

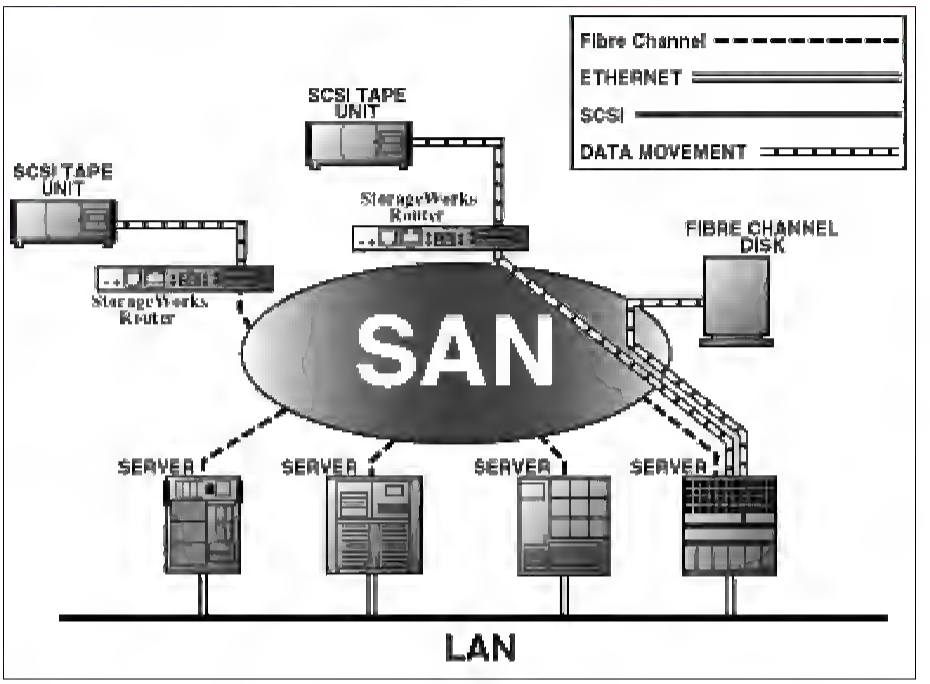
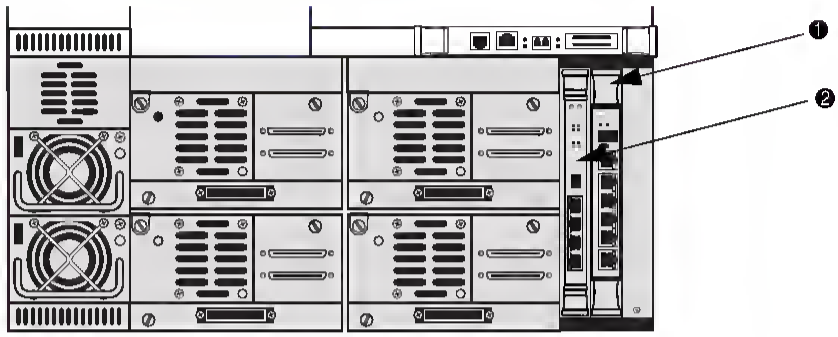


Figure 10: LAN-free backup and restore

Interface Manager card

The HP StorageWorks Interface Manager is a management card designed to consolidate and simplify the management of multiple FC interface controllers installed in the library. It also provides SAN-related diagnostics and management for library components including interface controllers, drives, and robotics. The Interface Manager card, in conjunction with HP StorageWorks Command View TL software, provides remote management of the library via a serial, telnet, or web-based GUI interface.

The Interface Manager card is located in drive cluster 0 to the right of the cluster controller card (see Figure 11).



❶ Interface manager card ❷ Cluster cantroller card

Figure 11: Interface Manager card

Note: Additionol odvonced SAN security ond monogement feotures ore ovoiloble vio permonent softwore licenses. For more informotion, refer to the documentotion thot shipped with the Interfoce Monoger ond Commond View TL softwore kit. Detoils ore olso ovoiloble ot http://www.hp.com/support/cvtl.

Note: Commond View TL, provided with your librory, is o utility thot provides diognostics ond monogement by occessing devices through o LAN infrastructure. For more informotion on Commond View TL, go to http://www.hp.com/support/cvtl.

Note: HP StorageWorks Librory ond Tope Tools (L&TT) is o diognostic utility thot con occess devices ocross o FC infrostructure. For more informotion on L&TT, go to http://www.hp.com/support/tapetools.

The Interface Manager communicates with the management station over the LAN. The management station is a Microsoft® Windows-based PC (server) that hosts the Command View TL software. Ideally, the management station should have a static IP address and be dedicated for use with the Interface Manager and Command View TL software.

Note: For information on using the Command View TL software, see the *HP StorageWorks Interface Manager and Command View TL User Guide* that shipped with your library or visit http://www.hp.com/support/cvtl.

Any client machine on the LAN can communicate with the Interface Manager either through the GUI web interface, or through a Telnet command line interface (CLI). At a higher level, multiple libraries, each containing an Interface Manager card, can be connected to a single management station. Each Interface Manager card can communicate with only one management station, but the management station can communicate with multiple Interface Manager cards (see Figure 12).

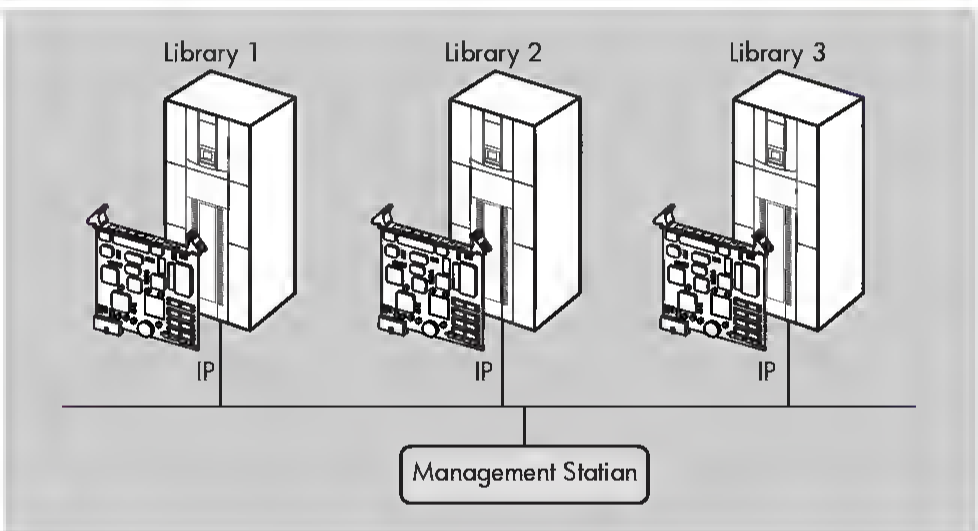


Figure 12: Multiple libraries connected to a single management station

Tip: HP recommends that you install Command View TL on a single dedicated server (management station) on the LAN. However, it is possible to install Command View TL on multiple servers. In this scenario, if one management station claims a library for management, then that same library cannot be managed by any other management station. A library can only be managed by one management station at a time.

Library storage locations and slot numbering

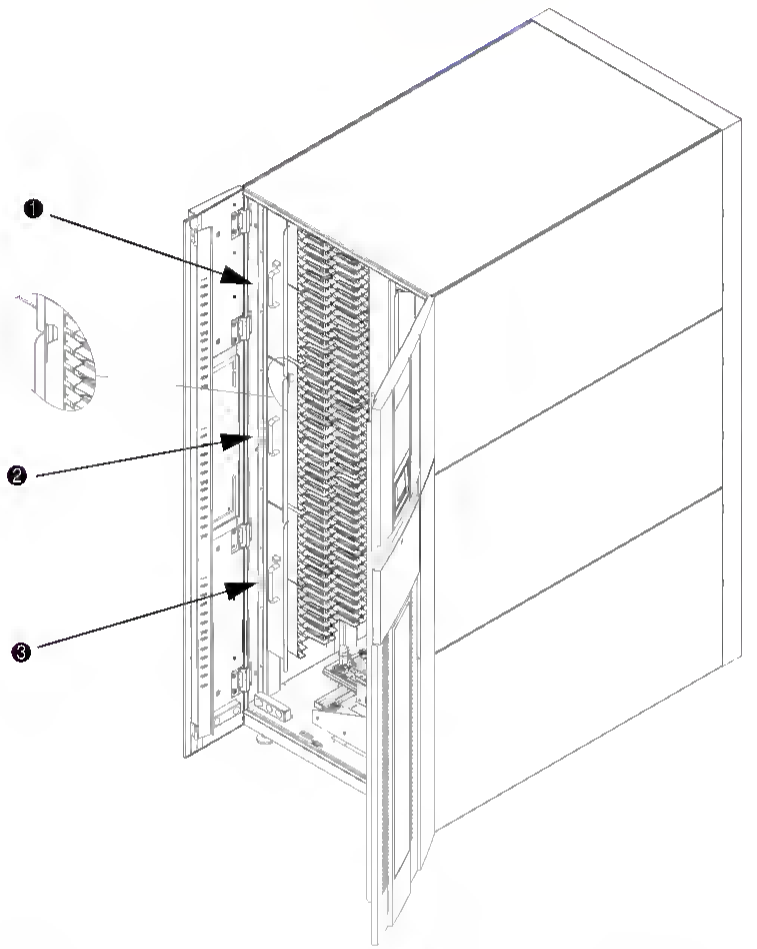
The HP StorageWorks ESL E-Series tape library is an automated tape storage and retrieval library that may consist of up to 24 tape drives and up to 718 Ultrium tape cartridges, or 636 SDLT tape cartridges, or a combination of Ultrium and SDLT tape cartridges in a mixed-media system.

The library stores tape cartridges in the following locations:

- Left panels
- Right panels
- Back panels

Note: The number of tape cartridge slots depends on the drive technology used, and on a mixed-media system, on the ratio of Ultrium and SDLT panels used and their locations. The number of back panel slots depends on how many drive clusters are in the library. See Ultrium library, page 41, SDLT library, page 43, and Mixed media library, page 45 for tape cartridge quantity information.

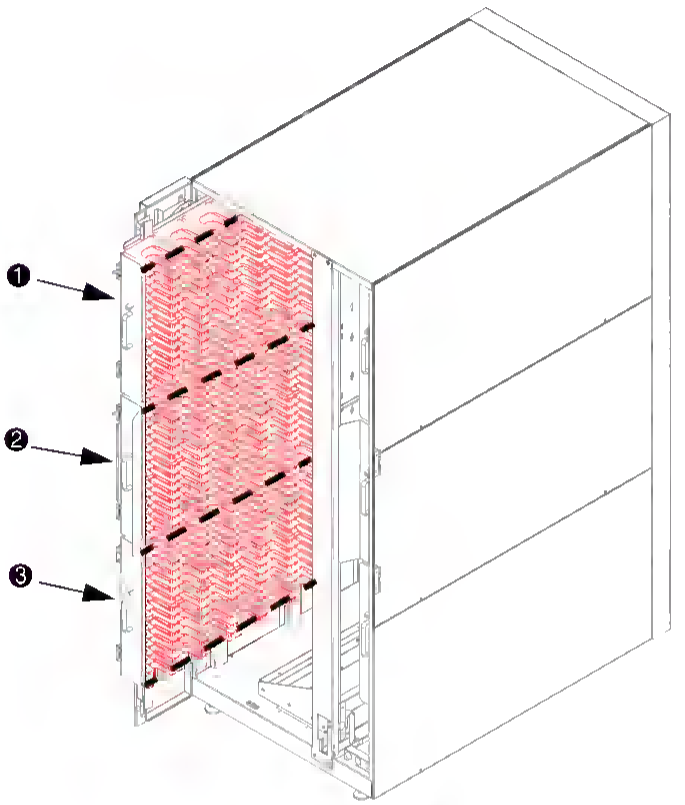
To slide the slot panels out of the cabinet, press the slot panel latches down and pull the slot panel out of the cabinet (see Figure 13).



❶ Upper load port panel latch
❷ Middle load port panel latch
❸ Lower load port panel latch

Figure 13: Sliding the slot panels out of the cabinet

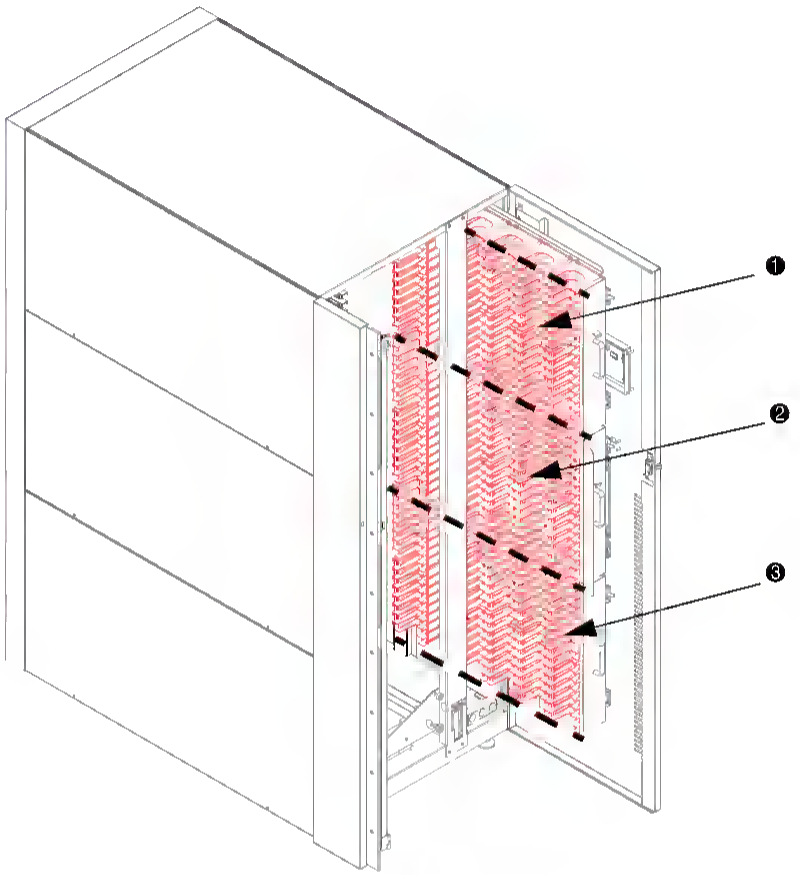
Figure 14 shows the left panel bins. Begin with panel 1 and load top to bottom and left to right. Continue with panel 2 in the same manner, and finally, panel 3.



❶ Panel 1
❷ Panel 2
❸ Panel 3

Figure 14: Bin shelf numbering, left panels

Figure 15 shows the right panel bins. Begin with panel 4 and load top to bottom and left to right. Continue with panel 5 in the same manner, and finally, panel 6.

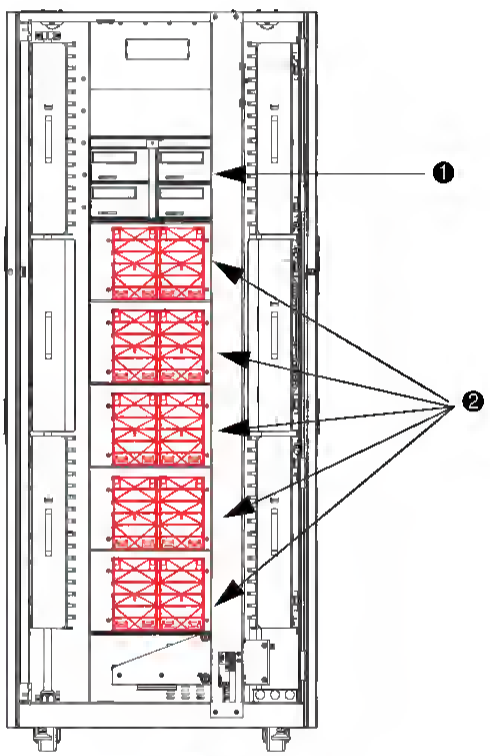


❶ Panel 4
❷ Panel 5
❸ Panel 6

Figure 15: Bin shelf numbering, right panels

Figure 16 shows the back panel bins. Each column has seven slots. Begin at the top, with the panel corresponding to cluster 0, and load top to bottom and left to right. Continue loading each sequential cluster, top to bottom and left to right.

Note: The number of slots located in the back panel varies with the number of drive clusters installed.



1 Cluster 0 2 Back panel pins

Figure 16: Bin shelf numbering, back panel

Note: Upgrade capacity in ESL-E 322e and ESL-E 286e partial capacity units by adding one or more panels. For more information, see the *HP StorageWorks Interface Manager and Command View TL User Guide* that shipped with your library or visit http://www.hp.com/support/cvtl.

Ultrium library

Table 3 shows storage capacity in Ultrium-only libraries with removable magazines.

Table 3: Ultrium library storage elements

Number of drives	Load ports used	Load port capacity	User slots
1 - 4	0	0	712
1 - 4	Left only	16	696
1 - 4	Right only	32	680
1 - 4	Both	48	664
5 - 8	0	0	698
5 - 8	Left only	16	682
5 - 8	Right only	32	666
5 - 8	Both	48	650
9 - 12	0	0	684
9 - 12	Left only	16	668
9 - 12	Right only	32	652
9 - 12	Both	48	636
13 - 16	0	0	670
13 - 16	Left only	16	654
13 - 16	Right only	32	638
13 - 16	Both	48	622
17 - 20	0	0	656
17 - 20	Left only	16	640
17 - 20	Right only	32	624
17 - 20	Both	48	608
21 - 24	0	0	642
21 - 24	Left only	16	626
21 - 24	Right only	32	610
21 - 24	Both	48	594

Note: Slots in enabled load ports cannot be used as data slots.

Table 4 shows storage capacity in Ultrium-only libraries with fixed magazines.

Table 4: Ultrium library storage elements

Number of drives	Load ports used	Load port capacity	User slots
1 - 4	0	0	718
1 - 4	Left only	18	700
1 - 4	Right only	36	682
1 - 4	Both	54	664
5 - 8	0	0	704
5 - 8	Left only	18	686
5 - 8	Right only	36	668
5 - 8	Both	54	650
9 - 12	0	0	690
9 - 12	Left only	18	672
9 - 12	Right only	36	654
9 - 12	Both	54	636
13 - 16	0	0	676
13 - 16	Left only	18	658
13 - 16	Right only	36	640
13 - 16	Both	54	622
17 - 20	0	0	662
17 - 20	Left only	18	644
17 - 20	Right only	36	626
17 - 20	Both	54	608
21 - 24	0	0	648
21 - 24	Left only	18	630
21 - 24	Right only	36	612
21 - 24	Both	54	594

Note: Slots in enabled load ports cannot be used as data slots.

SDLT library

Table 5 shows storage capacity in an SDLT-only library with removable magazines.

Table 5: SDLT library storage elements

Number of drives	Load ports used	Load port capacity	User slots
1 - 4	0	0	630
1 - 4	Left only	14	616
1 - 4	Right only	28	602
1 - 4	Both	42	588
5 - 8	0	0	618
5 - 8	Left only	14	604
5 - 8	Right only	28	590
5 - 8	Both	42	576
9 - 12	0	0	606
9 - 12	Left only	14	592
9 - 12	Right only	28	578
9 - 12	Both	42	564
13 - 16	0	0	594
13 - 16	Left only	14	580
13 - 16	Right only	28	566
13 - 16	Both	42	552
17 - 20	0	0	582
17 - 20	Left only	14	568
17 - 20	Right only	28	554
17 - 20	Both	42	540
21 - 24	0	0	570
21 - 24	Left only	14	556
21 - 24	Right only	28	542
21 - 24	Both	42	528

Note: Slots in enabled load ports cannot be used as data slots.

Table 6 shows storage capacity in an SDLT-only library with fixed magazines.

Table 6: SDLT library storage elements

Number of drives	Load ports used	Load port capacity	User slots
1 - 4	0	0	636
1 - 4	Left only	16	620
1 - 4	Right only	32	604
1 - 4	Both	48	588
5 - 8	0	0	624
5 - 8	Left only	16	608
5 - 8	Right only	32	592
5 - 8	Both	48	576
9 - 12	0	0	612
9 - 12	Left only	16	596
9 - 12	Right only	32	580
9 - 12	Both	48	564
13 - 16	0	0	600
13 - 16	Left only	16	584
13 - 16	Right only	32	568
13 - 16	Both	48	552
17 - 20	0	0	588
17 - 20	Left only	16	572
17 - 20	Right only	32	556
17 - 20	Both	48	540
21 - 24	0	0	576
21 - 24	Left only	16	560
21 - 24	Right only	32	544
21 - 24	Both	48	528

Note: Slots in enabled load ports cannot be used as data slots.

Mixed media library

An Ultrium or SDLT library at firmware level 2.0 or greater, can be converted into a mixed-media library by exchanging existing panel 1; panels 1 and 2; or panels 1, 2, and 3 for the type of media panel not yet in the library. Mixed-media libraries require library partitioning, with one media type per partition. Refer to *HP StorageWorks Interface Manager and Command View TL Users Guide* to learn about and use library partitioning. Removable magazines are also required in a mixed-media library.

These requirements impact library operations in the following ways:

- If you convert panel 1 only to a new media type, neither load port can be used to insert or remove media from that panel. Because the left and right load ports are on panels 2 and 5, they must have the same media type as the rest of panels 2 and 5.
- If panels 1 and 2 (or 1, 2, and 3) are converted to a new media type, the left load port can be used to insert or remove media from the converted panels. The right load port is used to insert or remove media from the existing panels.
- The type of media added to your library is on the left side of the library only; therefore, the additional media type has only one column of load port capacity, and the existing media type has two columns of load port capacity.

These are important when determining the library storage capacity. Storage capacity in a mixed-media library depends on the quantity of panels exchanged, the location of media types you are using, whether the load ports are enabled, and the number of drives in the library.

Note: In order to use mixed media, the library must be at firmware revision level 2.0 or greater. Update the firmware before installing mixed media in the library.

Library Operations

2

This chapter describes the following basic library operating procedures:

- Taking ESD precautions, page 48
- Preparing tape cartridges, page 53
- Inserting tape cartridges, page 60
- Closing the cabinet doors and access panels, page 61
- Powering the library on and off, page 63
- Using the OCP, page 65
- Inserting tape cartridges into a fixed load port, page 81
- Using removable magazines, page 82

Taking ESD precautions

Components within the library contain static-sensitive parts. To prevent damage to these parts while performing installation, maintenance, or replacement procedures, observe the following precautions:

- Keep the cabinet turned off during all installation, maintenance, and replacement procedures.
- Keep the cabinet power cord connected to a grounded power outlet except when working with AC electrical components.

WARNING: This product can only be used with an HP approved power cord for your specific geographic region. Use of a non-HP approved power cord may result in: 1) not meeting individual country specific safety requirements; 2) insufficient conductor ampacity that could result in overheating with potential personal injury and/or property damage; and 3) fracturing resulting in the internal contacts being exposed, which potentially could subject the user to a shock hazard. HP disclaims all liability in the event a non-HP approved power cord is used.

AVERTISSEMENT : ce produit ne peut être utilise qu'avec un cordon d'alimentation approuvé por HP pour votre zone géographique. L'emploi d'un cordon d'alimentation non approuvé par HP peut avoir les conséquences suivantes : 1) non-conformité aux spécifications de sécurité du pays concerné ; 2) intensité admissible du conducteur insuffisante pouvant provoquer une surchauffe créont un risque de blessure ou d'endommagement du produit ; et 3) rupture pouvant exposer les contacts internes et créer un risque d'électrocution pour l'utilisateur. HP décline toute responsabilité en cas d'utilisation d'un cordon d'alimentation non approuvé.

VORSICHT: Dieses Produkt kann ausschließlich mit einem van HP für Ihre Regian zugelassenen Netzkabel verwendet werden. Die Verwendung eines nicht van HP zugelassenen Netzkabels kann falgende Kansequenzen haben: 1) Nichteinhaltung der natianalen Sicherheitsbestimmungen, 2) Überschreiten der Strambelastbarkeit des Netzkabels, was zu einer Überhitzung und in der Falge zu Verletzungen und Sachschäden führen kann, 3) Stramschlaggefahr durch Kabelbruch und Freilegen der Adern. Für den Fall, dass ein nicht van HP zugelassenes Netzkabel verwendet wird, übernimmt HP keinerlei Haftung.

AVVERTENZA: Il presente prodatta pua essere utilizzata esclusivamente can un cava di alimentaziane appravata da HP specifica per la regiane geografica dell'utente. L'utilizza di un cava di alimentaziane nan appravata da HP patrebbe camportare: 1) la nan canfarmità alle narmative lacali in materia di antinfartunistica; 2) l'insufficienza della capacità di amperaggia del canduttare can canseguente surriscaldamenta e patenziali lesiani persanali e/a danni alla praprietà; 3) la rattura del prodatta can canseguente esposiziane dei cantatti interni e patenziali lesiani da scasse. HP rifiuta ogni respansabilità in casa di utilizza di un cava di alimentaziane nan appravata da HP.

警告 ：本製品を使用する場合は、ご使用の地域で定められた HP 認定の電源コードを使用してください。HP が認定していない電源コードを使うと、以下の状態となる可能性があります。 1) ご使用の地域の安全な取り扱いに関する規定を満たさない。2) 導電体の電流容量が不十分だと、オーバーヒートし、けがや装置の損傷につながる。3) 破損の結果内部の接続個所がむき出しとなり、ユーザーが感電する危険がある。
HP 非認定電源コード使用時の問題に関して、 HP は一切の責任を負いかねます。

WAARSCHUWING: Dit product mag ALLEEN worden gebruikt met een netsnoer dat door HP is goedgekeurd voor gebruik in uw regio. Als u een netsnoer gebruikt dat niet door HP is goedgekeurd, kan dit ertoe leiden dat: 1) u niet voldoet aan de specifieke veiligheidsvoorschriften van uw land, 2) de aderdikte te klein is, waardoor oververhitting kan optreden met lichamelijk letsel en/of beschadiging van de apparatuur tot gevolg, en 3) het netsnoer breekt, waardoor de interne contacten bloot komen te liggen met het risico van letsel door elektrische schok. HP wijst alle aansprakelijkheid af als u een netsnoer gebruikt dat niet door HP is goedgekeurd.

ADVERTENCIA: este producto sólo puede utilizarse con un cable de alimentación aprobado por HP pora su región geográfica específica. El uso de un cable de alimentación no aprobado por HP puede provocar lo siguiente: 1) el incumplimiento de requisitos de seguridad específicos del país; 2) insuficiente corriente permanente admisible de conductor que puede provocar un sobrecalentamiento y posibles lesiones personales o daños a la propiedad; y 3) una rotura que deje expuestos los contactos internos, lo que supone un peligro potencial de descarga eléctrica para el usuario. HP renuncia a toda responsabilidad en caso de utilizarse un cable de alimentación no aprobado por HP.

WARNING: Avoid contact with the power supplies, EMI filter, and all other AC electrical components while the cabinet is connected to a power outlet.

AVERTISSEMENT : évitez tout contact avec les blocs d'alimentation, le filtre EMI et tous les autres composonts électriques CA pendant que l'armoire est connectée à une prise de courant.

VORSICHT: Wenn der Schrank an das Stromnetz angeschlossen ist, dürten keinesfalls Netzteile, EMI-Filter oder andere elektrische Komponenten berührt werden.

AVVERTENZA: Evitare il contatto con alimentatori, filtri EMI e qualsiasi altra componente elettrica AC quando il cabinet è collegato a una presa di corrente.

警告：キャビネットが電源コンセントに接続している間は、電源、EMI フィルタ、およびその他すべての AC 電源装置に触らないようにしてください。

WAARSCHUWING: Raak de voedingseenheden, het EMI-filter en de andere elektrische onderdelen niet aan als kast is aangesloten op een stopcontact.

ADVERTENCIA: Evite el contacto con fuentes de alimentación, filtros EMI y otros componentes eléctricos de CA mientras el receptáculo esté conectado a la toma de corriente.

- Use an antistatic wrist strap when touching internal cabinet components. To use the wrist strap properly, place the band around your wrist and attach the clip to the cabinet frame. Keep the strap on until you are ready to close the cabinet doors.
- Keep static-sensitive parts in their shipping containers until ready for installation.
- Do not place static-sensitive parts on any metal surface. If you need to put down a static-sensitive part, place it inside its protective shipping bag or on a grounded antistatic mat.
- Avoid direct contact with static-sensitive parts. Avoid touching connectors and discrete components.
- Close cabinet door and access panel when not working on the cabinet.
- Be careful when installing the cabinet or handling components in dry climates or environments where cold weather heating is used. Environments such as these with lower relative humidity have greater potential to produce static electricity.

Note: In environments with high potential for static electricity, take additional precautions, such as the use of an antistatic smock or a grounded antistatic mat.

Preparing tape cartridges

Caution: Handle tape cartridges with care. Da nat drop ar mishandle them, ar place them near saurces af electromagnetic interference. Raugh handling can damage the cartridge, making it unusable and patentially hazardaus ta the tape drives.

Labeling tape cartridges

Caution: The misuse and misunderstanding af bar code technalogy can result in backup and restare failures. Ta ensure that yaur bar cades meet HP's quality standards, always purchase them from an appraved supplier and never print bar code labels yaurself. Far mare infarmatian, refer ta the arder farm provided with the library, as well as the *Bar Code Label Requirements, Compatibility and Usage* white paper available from http://www.hp.com/support.

Note: Far infarmatian an ardering tape cartridges and bar cade labels, refer ta the ardering sheet that shipped with yaur library.

Attaching a bar code label to each tape cartridge enables the library and application software to identify the cartridge quickly, thereby speeding up inventory time. Make it a practice to use bar code labels on your tape cartridges. Your host software may need to keep track of the following information and the associated bar code:

- Date of format or initialization
- Tape's media pool
- Data residing on the tape
- Age of the backup
- Errors encountered while using the tape (to determine if the tape is faulty)

Note: If you have more than 100 unlabeled tape cartridges, your library will hang during inventory or when you power on the library. When this happens, `Going on line` displays in the OCP.

Ultrium bar code labels

Ultrium cartridges have a recessed area located on the face of the cartridge next to the write-protect switch. Use this area for attaching the adhesive-backed bar code label (see Figure 17). Do not apply labels onto the cartridge except in this designated area.

Caution: The bar code label should be applied as shown in Figure 20, page 58, with the alphanumeric portion facing the hub side of the cartridge. Never apply multiple labels onto a cartridge, because extra labels can cause the cartridge to jam inside a tape drive.

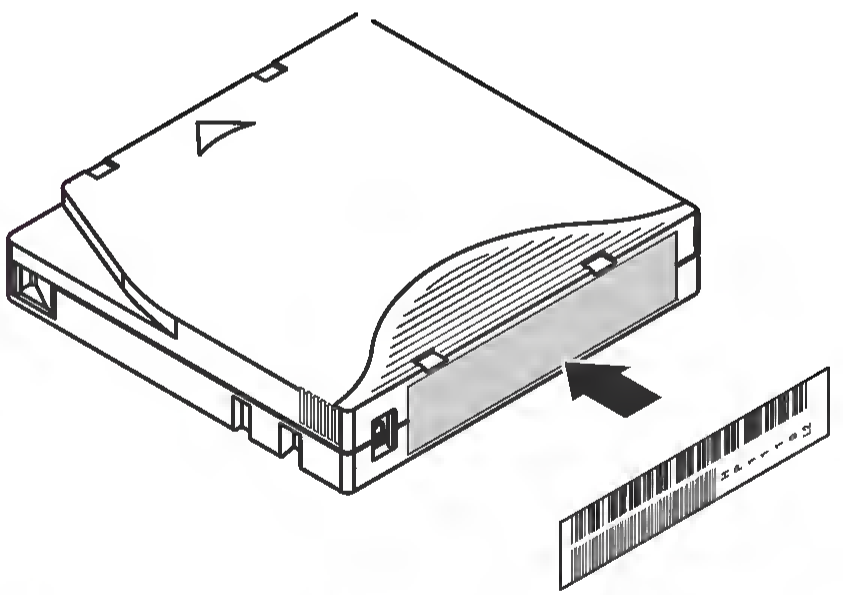


Figure 17: Attaching an Ultrium bar code label

For successful operation of your tape library, place the bar code label *entirely* within the recessed area, ensuring that no part of the label is outside of it (see Figure 18).

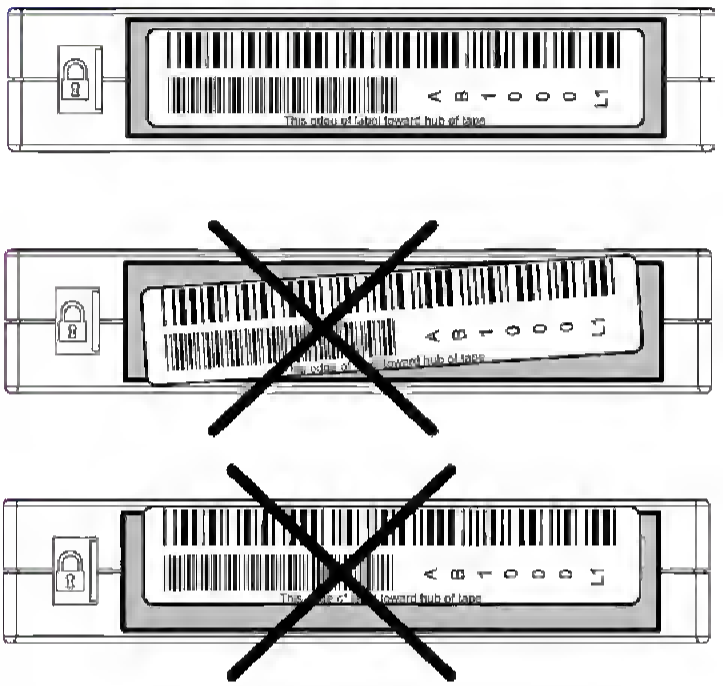


Figure 18: Proper Ultrium bar code label placement

SDLT bar code labels

SDLT cartridges have a front slide slot located on the face of the cartridge next to the write-protect switch (see Figure 19). Inserting the bar code label by sliding it into the slot.

Caution: Do not apply labels to the top, bottom, sides, or back of the cartridge as this may cause damage to the tape drive, or interfere with reliable operation.

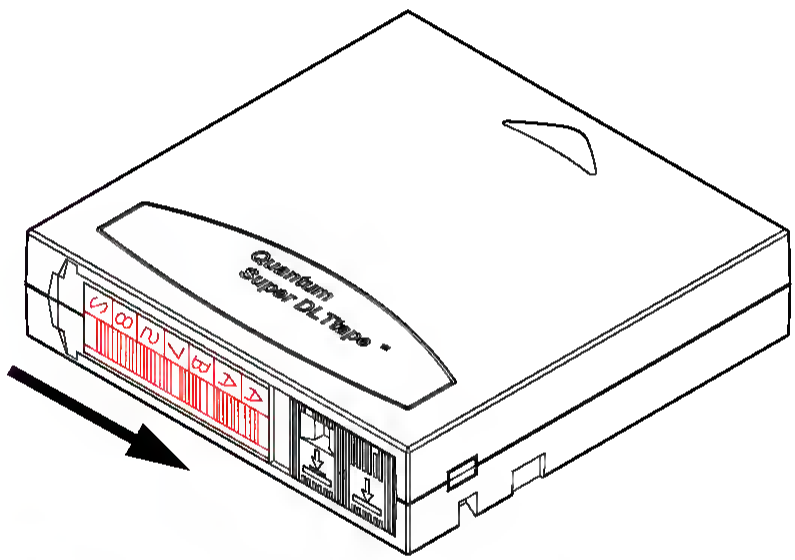


Figure 19: Inserting an SDLT bar code label

Media label identifiers

Be sure to use the proper bar code labels for your drive technology. Table 7 lists the identifier that is found at the end of 7- or 8-character SDLT and Ultrium bar code labels.

Caution: To ensure thot your bor codes meet HP's quolity stondords, olways purchose them from on opproved supplier ond never print bor code lobels yourself. For more informotion, refer to the order form provided with the library, os well os the *Bar Code Label Requirements, Compatibility and Usage* white poper ovoiloble from http //www hp com/support.

Table 7: Media label identifiers

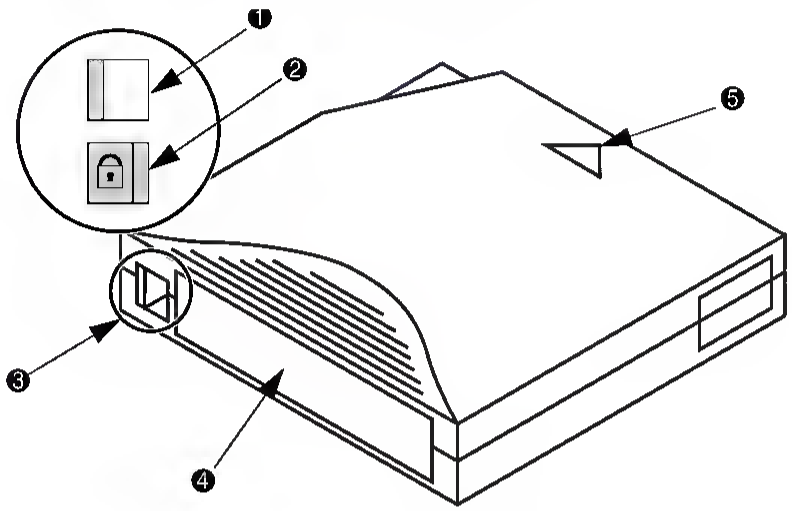
Cartridge Type	Density	Label Identifier
SDLT	110/220 GB	S or S1
SDLT	160/320 GB	S or S2
SDLT 600	300/600 GB	2
Ultrium 230	100/200 GB	L1
Ultrium 460	200/400 GB	L2
Ultrium 960	400/800 GB	L3

Setting the write-protect switch

Each tape cartridge has a sliding write-protect switch. This switch determines whether new data can be written to the tape cartridge (write-enabled) or whether data on the tape cartridge is protected from being erased or overwritten (write-protected).

Write-protecting Ultrium tape cartridges

By moving the switch to the left (Figure 20), the tape cartridge is write-enabled. By moving the switch to the right, the tape cartridge is write-protected.

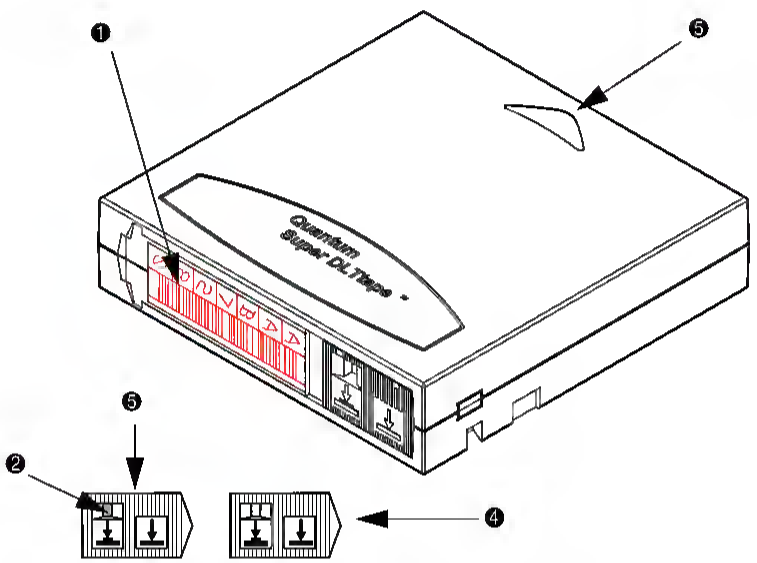


❶ Write enabled
❷ Write protected
❸ Write protect switch
❹ Bar code label
❺ Insertion arrow

Figure 20: Write-protecting Ultrium tape cartridges

Write-protecting SDLT tape cartridges

By moving the switch to the left (Figure 21), the tape cartridge is write-protected (orange indicator is visible). By moving the switch to the right, the tape cartridge is write-enabled (orange indicator is not visible).



❶ Barcode label
❷ Orange indicatar
❸ Write pratect -- slide left
❹ Write enabled (default) -- slide right
❺ Insertian arrow

Figure 21: Write-protecting SDLT tape cartridges

Inserting tape cartridges

Load tape cartridges into the library starting with the left side panels, then the right side panels, and finally the back panel (see "Library storage locations and slot numbering" on page 36 for detailed installation procedures). Be sure all cartridges are properly positioned with the barcode facing you and fully seated in the bins.

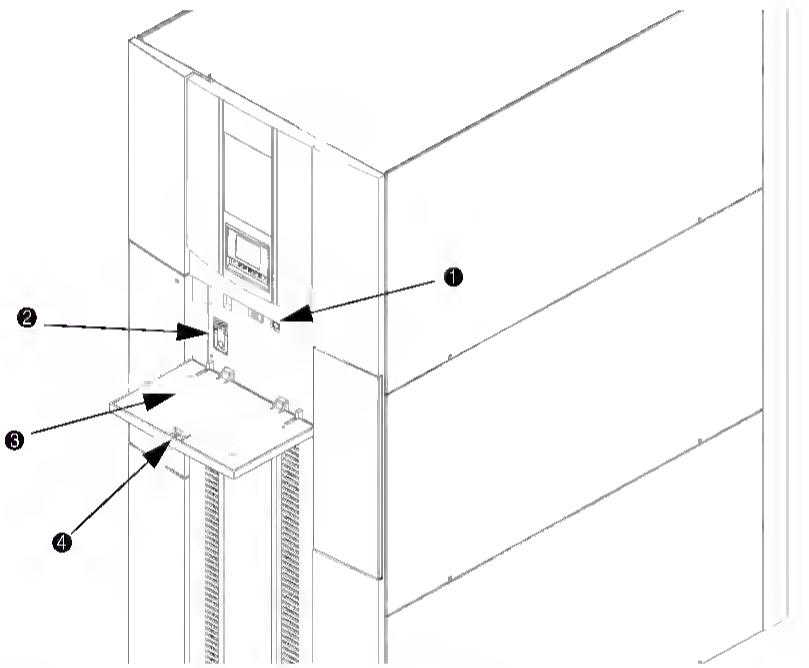
Caution: Handle tape cartridges with care. Da nat drop ar bang them, ar place them near saurces af electramagnetic interference. Raugh handling can displace the tape leader, making the cartridge unusable and patentially hazardaus ta the tape drives.

Closing the cabinet doors and access panels

The library has one front door and one back door.

1. Close and lock the front door using the key provided in the accessory kit (see Figure 22).

Note: The laptap tray must be lawered ta access the frant daar latch.



❶ Power button
❷ Front door latch
❸ Loptop tray
❹ Loptop latch

Figure 22: Closing the front door

2. Close and lock the back door using the key provided in the accessory kit (see Figure 23).

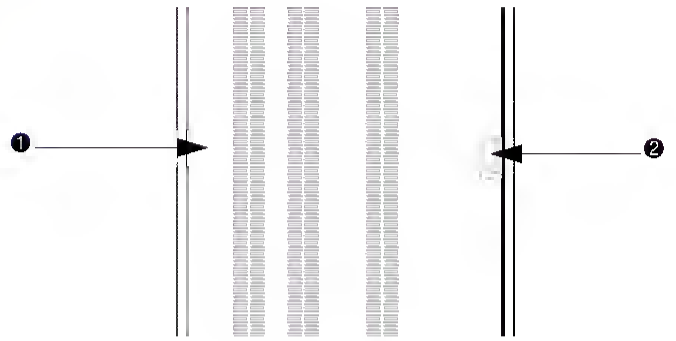


Figure 23: Closing the back door

Powering the library on and off

This section explains:

- Powering on the library, page 63
- Placing the library on-line or off-line, page 63
- Powering off the library, page 64

Powering on the library

To power on the library:

1. Open the back door of the library cabinet and flip the breaker switches to the on position (right).

   The breaker switches are on the power distribution unit located on the bottom right side of the library cabinet.
2. Verify that power cables are firmly in place.
3. Close all library doors.
4. Power on the power switch located behind the laptop tray (see Figure 22, page 61).

Note: The library requires severol minutes to power on. Nothing displays on the OCP for the first few minutes of this process.

Placing the library on-line or off-line

To place the library on- or off-line:

1. With the library powered on, press the **Ops** button on the OCP to access the **Operations** screen.
2. Select **Cabinet** and use the up and down arrows to take the library off-line.

For more information on the **Operations** screen, see "Operations screen" on page 77.

Powering off the library

To power off the library:

1. Place the library off-line, see "Placing the library on-line or off-line" on page 63.

   The library robotics completes any current commands and then stops.
2. Verify that the OCP display indicates "Off-line" from the **Operations** screen.
3. Verify that the media picker is empty.
4. Verify that no backups are in process.
5. Turn off the power switch located on the front of the library (see Figure 22 on page 61).
6. Wait for the library to complete the shutdown process. (This usually takes 30 seconds, but may take up to two minutes.)
7. Open the back door of the library cabinet and flip the breaker switches to the off position (left). The breaker switches are on the power distribution unit located on the bottom left side of the library cabinet.

Note: When powering off the library, ensure that the two breaker switches on the power distribution unit are in the off (left) position.

Using the OCP

The OCP is located on the front of the library. The menus on the OCP allow you to obtain information about the library, execute library commands, and test library functions.

The status bar at the top of the OCP displays library status at all times, at the left of the bar. The status can be **Online**, **Going Online**, or **Offline**, followed by a warning level: **OK**, **Warning**, or **Critical**. In addition, when a library firmware upgrade is in progress, **Upgrading FW** is displayed on the right side of the status bar.

Before using the OCP to perform library functions, familiarize yourself with the:

- Home screen, page 65
- OCP buttons, page 66

Home screen

The first screen the OCP displays after library initialization is the home screen. This screen displays library status and provides information on the IP address, number of bins, tape drives, ports, and date (see Figure 24).

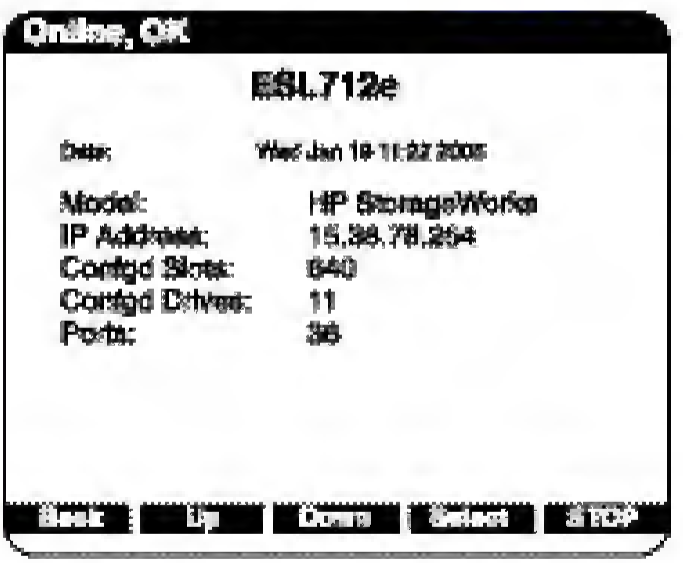


Figure 24: Home screen

OCP buttons

At the bottom of each OCP screen are up to five button labels. These labels indicate the functions of the five push buttons below the OCP. To select a function, press the push button directly below the button label on the OCP screen.

OCP components

The OCP allows you to perform various functions on the library. Table 8 provides a list of the OCP functionality available from the **Home** screen (see Figure 24).

Toble 8: OCP components

Home Screen	Menu Screen	Ports Screen	Ops Screen	Diags Screen
Stotus disploy: ■ Library Nome ■ IP Address ■ Slots ■ Drives ■ Ports ■ Dote	Menu items: ■ Librory ■ Cobinet ■ Heolth Stotus ■ Setup ■ Service ■ Event Log	Lood ports: ■ Open Left Lood Port ■ Open Right Lood Port ■ Open Both Lood Ports	Operations: ■ Cobinet — On-line — Off-line — Inventory — Reboot ■ Move Medio — Source Type — Source Position — Destinotion Type — Destinotion Position — Perform Move Now ■ Drives All — Reset — Unthreod — On — Off ■ Drives On/Off — Detoils — Reset — Unthreod — On — Off	Diognostics: ■ Robotics Self Test ■ Robotics to Home Position ■ Colibrote Cobinet ■ Sequentiol Slot Test ■ Sequentiol Drive Test ■ Rondom Test ■ Rondom Slot Test ■ Rondom Slot to Drive Test

Note: The **Stop** button locoted in the bottom right-hond portion of the OCP is ovoiloble from every OCP screen. This button stops the cobinet robot from moving ond tokes the cobinet offline. To stort the robotics ond return the cobinet to the online stote, press the **Start** button.

The following sections provide information on each function available from the library OCP:

- Menu screen, page 68
- Load Ports screen, page 76
- Operations screen, page 77
- Diagnostics screen, page 78
- Stop button, page 80

Menu screen

The **Menu** screen provides access to contact and cabinet information, as well as providing a way to setup library information.

To access the **Menu** screen, press **Menu** from the **Home** screen. The OCP displays the **Menu** screen (see Figure 25):

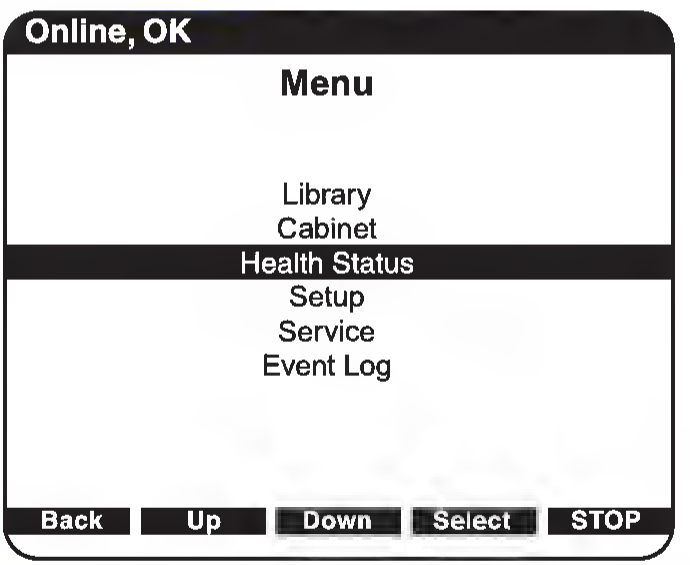


Figure 25: Menu screen

The **Menu** screen provides the following choices:

- Viewing library information, page 69
- Viewing cabinet information, page 70

- Viewing library health status information, page 71
- Viewing and editing setup information, page 72
- Viewing the event log, page 75

Viewing library information

To view library information:

1. From the **Menu** screen, use the up and down arrows to highlight **Library**, then press **Select**.

   The **Library** screen displays (see Figure 26).

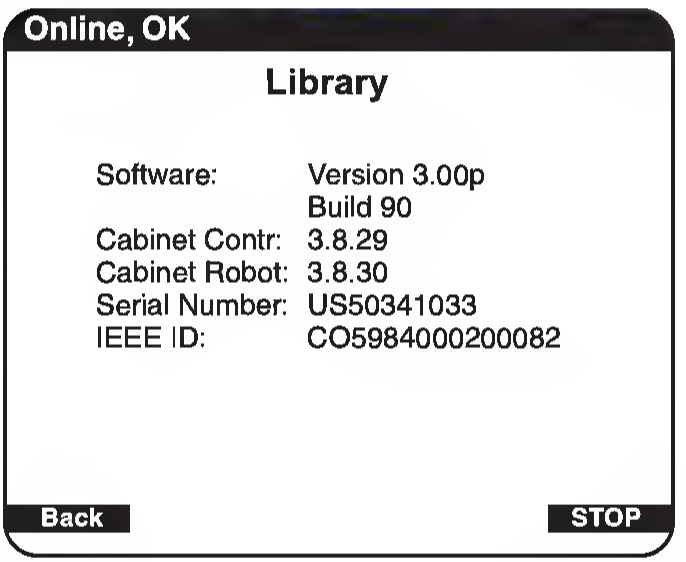


Figure 26: Library screen

The **Library** screen displays the following information about the library:

- Software - software version currently loaded on the library
- Cabinet Contr - the firmware revision on the cabinet controller smart media
- Cabinet Robot - the firmware revision on the robotics controller smart media
- Serial Number - serial number of the library

- IEEE ID - internal network identification of the cabinet that includes the date of manufacture, product type, and serial number

2. When you are finished viewing library information, press **Back** to return to the **Menu** screen.

Viewing cabinet information

To view library cabinet information:

1. From the **Menu** screen, use the up and down arrows to highlight **Cabinet,** then press **Select** to display the **Cabinet** screen (see Figure 27):

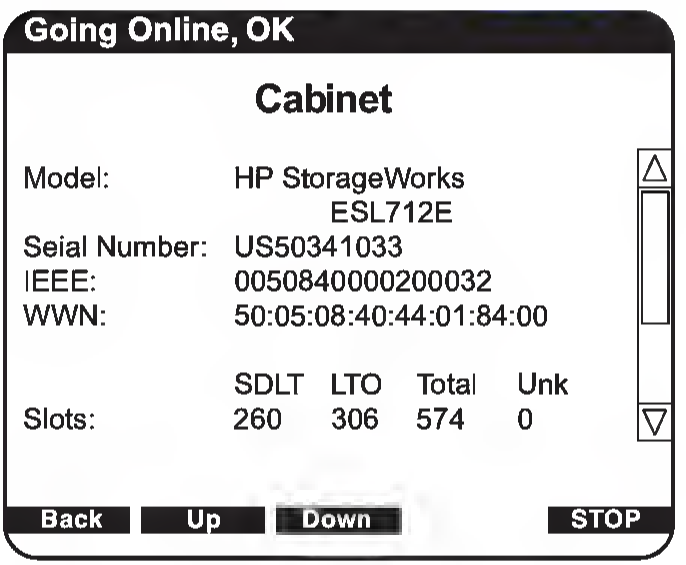


Figure 27: Cabinet screen

The **Cabinet** screen displays the following information about the library cabinet:

- Cabinet - name of the cabinet
- Model - model number of the cabinet
- Serial Number - serial number of the cabinet
- IEEE ID - internal network identification of the cabinet that includes the date of manufacture, product type, and serial number
- Slots - number of slots configured in the cabinet

- Drives - number of drives configured in the cabinet
- Load Ports - number of load port slots configured in the cabinet

2. When you are finished viewing cabinet information, press **Back** to return to the **Menu** screen.

Viewing library health status information

The **Health Status** screen captures current information about any errors present at the time **Health Status** is selected. Information about sensors with state of **Down**, **Warning**, or **Critical** is displayed, along with information on any drives with **Load Error**, **Not communicating**, **Cleaning requested,** or **Cleaning required**.

Note: Library status is cantinually displayed an the left side af the black bar at the tap of the OCP. Possible status messages are: **Online, OK**; **Online, Warning**; and **Online, Critical**. When multiple errars exist, the mast seriaus status is reparted. The **Health Status** screen is useful when the status bar shaws warning ar critical status.

To view the health status of the library:

1. From the **Menu** screen, use the up and down arrows to highlight **Health Status**, then press **Select**.

If there are no errors, the following **Health Status** screen displays (see Figure 28).

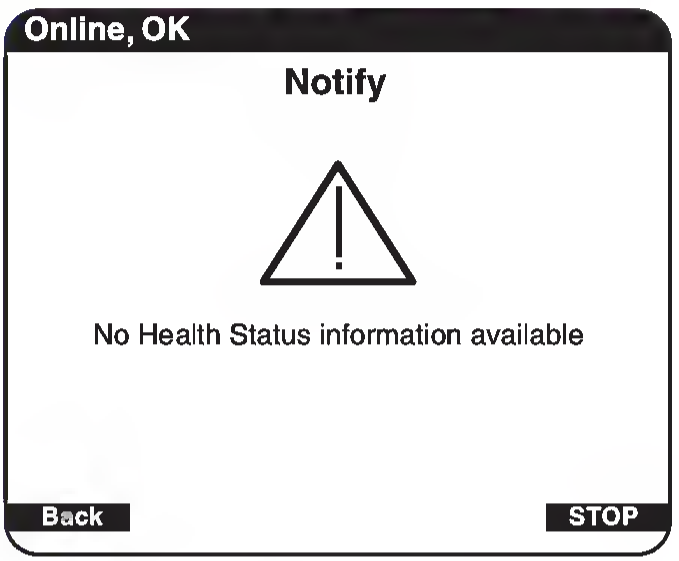


Figure 28: Health Status screen when no errors exist

If there are errors, present, they will be listed on the screen.

2. When you are finished viewing the error information, press **Back** to return to the **Menu** screen.

Note: The Health Status informotion is not soved. When you exit this screen, the informotion is gone.

Viewing and editing setup information

To view or edit the setup information:

1. From the **Menu** screen, use the up and down arrows to highlight **Setup**, then press **Select**.
2. The library prompts you for your password. Enter the 6-digit password and wait for validation. The response may not be immediate.

Note: The default password is 001122.

The **Setup** screen displays (see Figure 29).

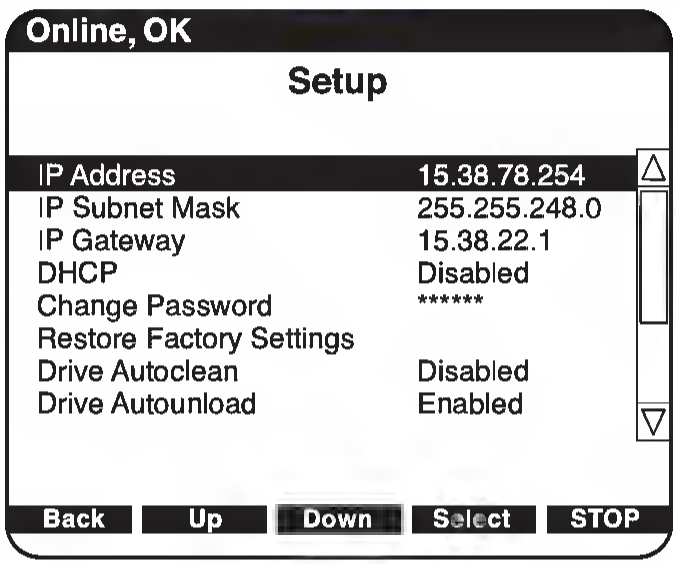


Figure 29: Setup screen

The **Setup** screen displays the following information:

- IP Address
- IP Subnet Mask
- IP Gateway
- DHCP
- Change Password
- Restore Factory Setting
- Drive Autoclean
- Drive Autounload
- Configured Drives
- Barcode Length
- Both Load Ports

- Left Load Port
- Right Load Port

3. To edit the setup information, use the up and down buttons to highlight the section and press **Select**.
   - To set the IP address, subnet mask, and gateway, use the up and down buttons to select the appropriate number and press **Select** to accept.
   - To enable/disable DHCP, use the up and down buttons to toggle between enable/disable. Press **Select** to accept the setting. If your library is not connected to a network that uses a DHCP server to assign IP information, disable this function.
   - To change the password, use the up and down buttons to select Change Password and press **Select**. To change the password, enter a 6-digit password using the numbers provided on the OCP. Press **Select** to accept the new password. When prompted, re-enter the password to confirm.
   - To enable autoclean, use the up and down buttons to select Autoclean and press **Select**. The default is disabled.
   - To enable or disable autounload, use the up and down buttons to select **Autounload** and press **Select**, then use the up and down buttons to choose **Enable** or **Disable**, then press **Select**.
   - To set the barcode length, use the up and down buttons to select **Barcode Length** and press **Select**. To set the barcode length, use the up and down buttons to display the appropriate number (from 1 to 9, or back to 0), then press **Select**. Default barcode length is 0, which means that a barcode of any length will be accepted.
   - To configure the number of tape drives in the cabinet, use the up and down arrows to select the number of drives and press **Select**.

Caution: If you have a partially filled drive cluster, change the number of tape drives to reflect the number of installed drives. For example, a cluster with two drives will show as four drives total with two being inactive. Use the **Setup** menu to change **Configured Drives** to 2 instead of 24, which is the default. This helps avoid potential issues with your application software.

   - To enable both load ports, use the up and down arrows to select **Both Load Ports**, then press **Select**. The default is disabled.

- To enable the left load port, use the up and down arrows to select **Left Load Port (##)**, then press **Select**. The default is disabled.
- To enable the right load port, use the up and down arrows to select **Right Load Port (##)**, then press **Select**. The default is disabled.

4. When you are finished viewing/editing the setup information, press **Back** to return to the **Menu** screen.

Note: Setting the IP oddress requires one odditionol step. After pressing `Select`, power down from the `Menu` screen.

Viewing the event log

In some cases, HP telephone support will ask you to view the events log in order to prepare your service representative to assist you. To view the event log:

1. Press **Menu** from the **Home** screen.
2. Use the **Down** button to highlight **EVENT LOG**, then press **Select**.
3. Scroll through the events listed in the log (see Figure 30) using the **Down** button.

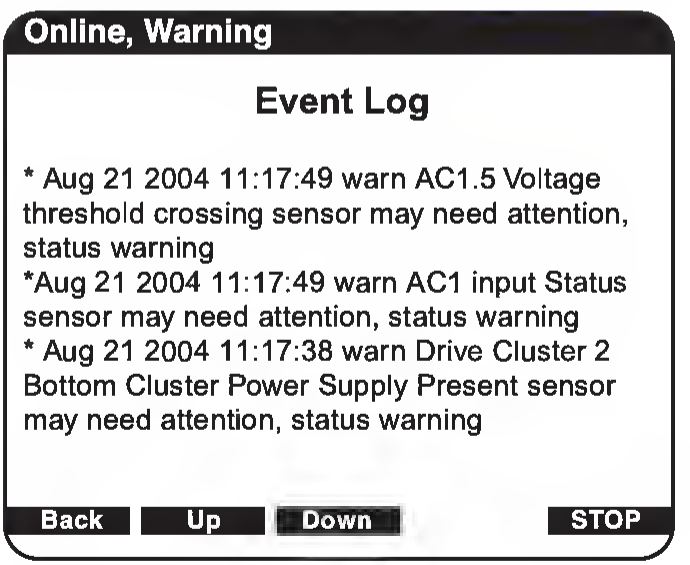

Online, Warning
Event Log
* Aug 21 2004 11:17:49 warn AC1.5 Voltage threshold crossing sensor may need attention, status warning
*Aug 21 2004 11:17:49 warn AC1 input Status sensor may need attention, status warning
* Aug 21 2004 11:17:38 warn Drive Cluster 2 Bottom Cluster Power Supply Present sensor may need attention, status warning
Back
Up
Down
STOP

Figure 30: Event Log screen

The items are listed chronologically, with the most recent event listed first.

Load Ports screen

The **Load Ports** screen allows you to lock or unlock a load port.

To access the **Load Ports** screen, press **Ports** from the **Home** screen. The OCP displays the **Load Ports** screen (see Figure 31).

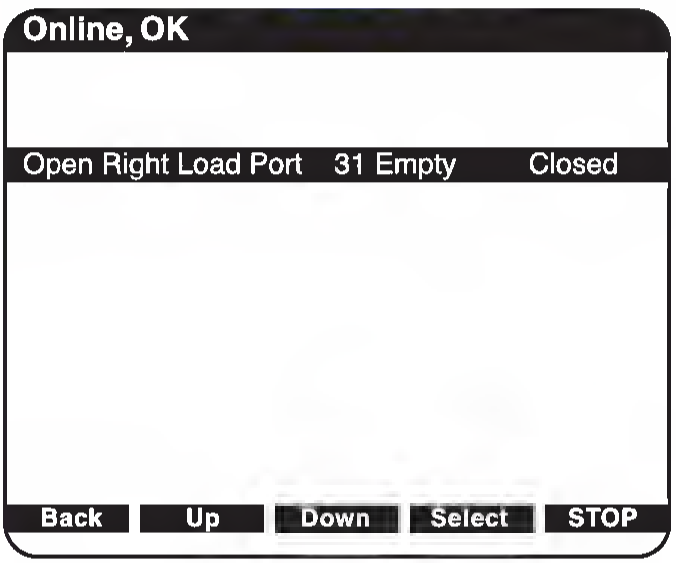


Figure 31: Load Ports screen

1. Use the up and down arrows to highlight the specific load port, then press **Select**.
2. Use the up and down arrows to choose **Open**, then press **Select**.

   A warning message appears to remind you to open the load port door.

Caution: Ensure that the load port door is open so that the door's clip is not damaged when the load port ejects.

---

3. Open the load port door and press **OK**. The load port moves forward.
4. Pull the load port towards you to access the removable magazines.

5. The OCP displays **Opening Left Load Port Done**, or **Opening Right Load Port Done**, depending on which port you selected.
6. Press **OK** to acknowledge that the load port is open.
7. When you are done, push the load port back into the cabinet until you hear it click into place.
8. Close the load port door.
9. When you are finished viewing the load port status, press **Back** to return to the **Menu** screen.

Note: When o lood port is opened ond closed, the lood port is inventoried.

Operations screen

The **Operations** screen allows you to view the status and issue commands to the cabinet and tape drives.

To access the **Operations** screen, press **Ops** from the **Home** screen. The **Operations** screen is displayed (see Figure 32).

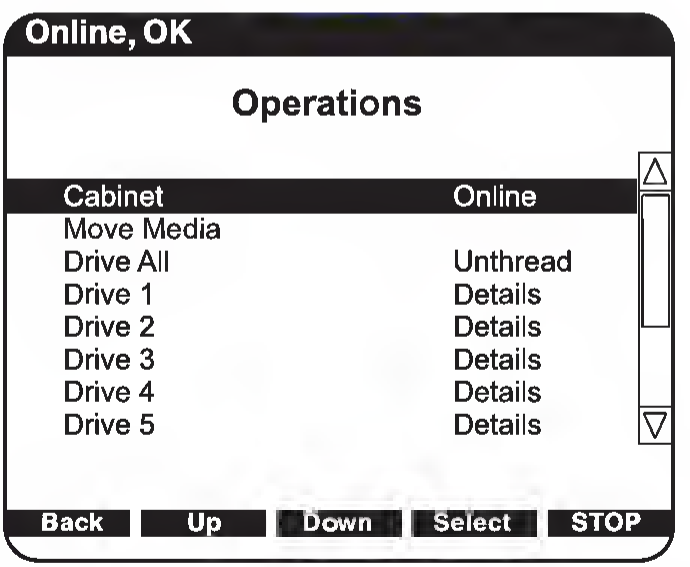


Figure 32: Operations screen

Diagnostics screen

The **Diagnostics** screen allows you to perform the following diagnostic tests on the library (see Table 9).

Note: The library must be off-line to run diognostic testing.

Table 9: Diagnostic tests

Test	Description
Robotics Self Test	Checks for unrestricted motion of the library robotics.
Robotics to Home Position	Colibrotes the library robotics ond sets it to the bottom of the library with the opticol sensor focing the bock.
Colibrote Cobinet	Checks the position of oll ponels ond columns, checks thot the picker is oligned with the slots.
Sequentiol Slot Test	Performs on inventory of the library, then checks eoch slot in the library, sequentiolly, to determine whether there is free movement of the topes in ond out of the slots.
Sequentiol Drive Test	Performs on inventory of the library, then checks drives in the library, sequentiolly, to determine whether it is communicoting properly with the drives.
Rondom Test	Performs on inventory of the library, then randomly selects ond runs one of the tests.
Rondom Slot Test	Performs on inventory of the library, then checks o sompling of slots in the library, in rondom order, to determine whether there is free movement of the topes in ond out of the slots.
Rondom Slot to Drive Test	Performs on inventory of the library, then checks o sompling of drives in the library, in random order, to determine whether it is communicoting properly with the drives ond whether there is free movement of the topes into ond out of the slots.

The Sequential Slot Test, Sequential Drive Test, Random Test, Random Slot Test, and Random Slot to Drive Test can be run from 1-500 times, or continuously until the test is manually ended. For each drive or slot test, running it once will check one drive or slot, whereas running it 100 times will check 100 drives or slots. If tests are run more times than there are drives or slots, the library will test drives or slots multiple times until it has performed the requested number of tests.

For example, if a library has 25 full slots and a sequential slot test is set to run 50 times, the library will test slots 1-25, then begin at 1 again and test through 25. If you set the same library to run the sequential slot test 60 times, it will test 1-25, 1-25, then 1-10.

To access the **Diagnostics** screen, press **Diags** from the **Home** screen. The OCP displays the **Diagnostics** screen (see Figure 33).

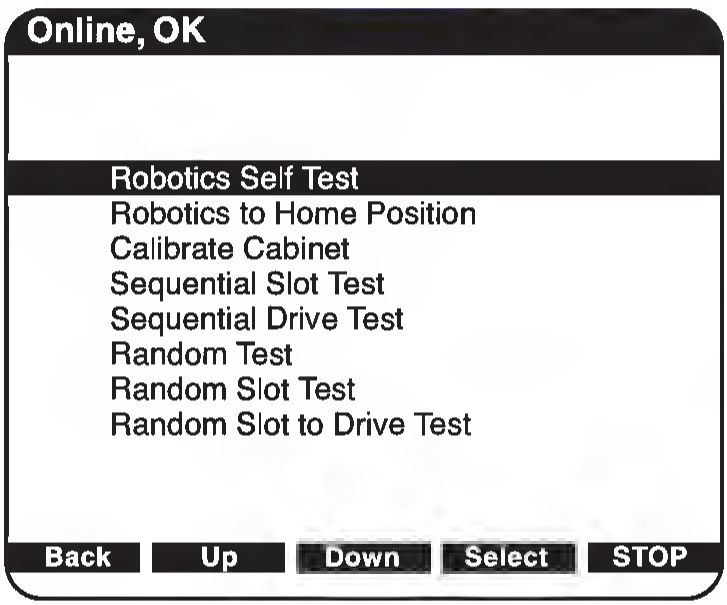


Figure 33: Diagnostics screen

To perform a diagnostic test:

1. Take the library off-line.
   a. Press the **OPS** button on the OCP to access the **Operations** screen.
   b. Select **Cabinet**.
   c. Use the up and down arrows to take the library off-line.
   d. Press **Back** to return to the main screen.
2. Use the up and down arrows to select the diagnostic test to perform and press **Select**.

3. If you did not take the library off-line, the OCP displays a notification (see Figure 34).

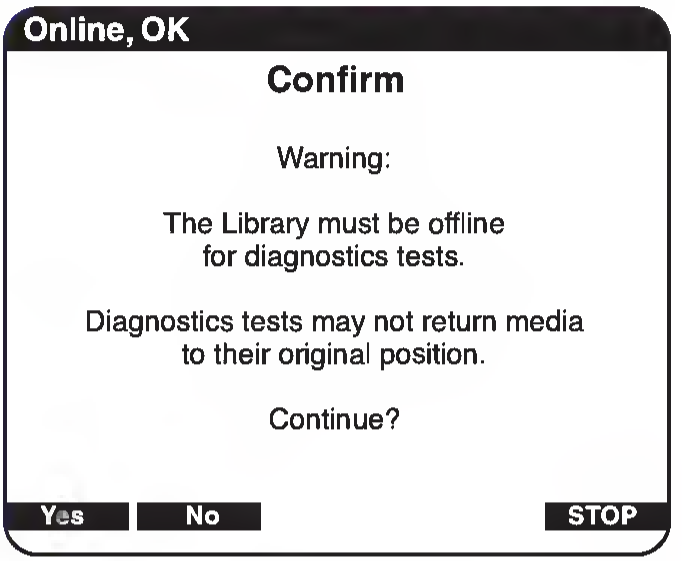


Figure 34: Diagnostics confirmation remaining offline

4. Select NO to take the library off-line, then run the test.

   The diagnostic test executes and the OCP displays a status screen indicating the test progress. When the test completes, the test result is shown next to the completed test.

5. When you are finished performing diagnostic tests, press **Back** to return to the **Menu** screen.

Stop button

The **Stop** button located in the bottom right portion of the OCP is available from every OCP screen. This button stops the cabinet robot from moving. To start the robotics, press the **Start** button.

Inserting tape cartridges into a fixed load port

With load ports enabled, tape cartridges are inserted into fixed magazines on the first column of the left panel and the first two columns of the right panel. Fixed magazines hold 18 Ultrium cartridges or 16 SDLT cartridges.

To insert a tape cartridge into a fixed magazine:

1. Prepare the tape cartridges to be inserted by affixing a bar code label and write-protecting or write-enabling each cartridge as desired.

   For more information about these procedures, refer to "Inserting tape cartridges" on page 60.

2. With the load port door open, place the tape cartridges in any available load magazine slot.

   The proper orientation for tape cartridge insertion is shown in "Ultrium tape cartridges" on page 25 and "SDLT 320 and 600 tape cartridges" on page 27.

3. Manually close the load port door by pushing the load port assembly into the cabinet. You will hear a click when it locks into position.

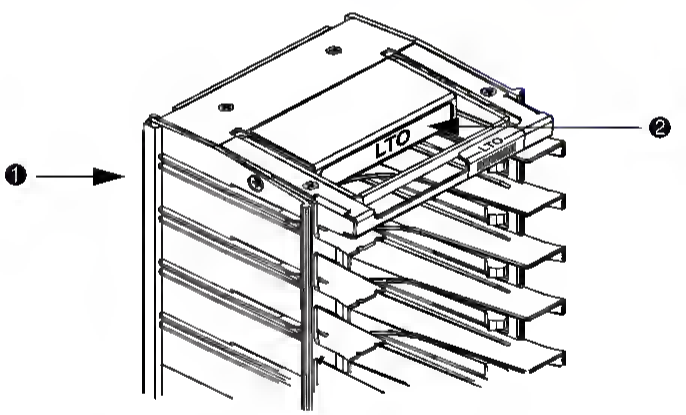
Using removable magazines

Removable magazines are used to import and export several tape cartridges at one time from the library without interrupting library operations. A removable magazine can hold 8 Ultrium tape cartridges, or 7 SDLT tape cartridges. A column can hold 2 removable magazines. Removable magazines can be used in the first column of the left load port, and the first two columns of the right load port.

Insert removable magazines

To use the removable magazines to load tape cartridges:

1. Prepare the tape cartridges by affixing a bar code label and write-protecting or write-enabling each cartridge as desired. See "Inserting tape cartridges" on page 60.
2. Load the tape cartridges into the removable magazine(s), using the same media type of tape cartridges and removable magazines (SDLT cartridges in an SDLT magazine; LTO cartridges in an LTO magazine). A removable magazine is labeled with its media type (see Figure 35).



❶ Removable magazine ❷ Media type label

Figure 35: Identify the removable magazine media type

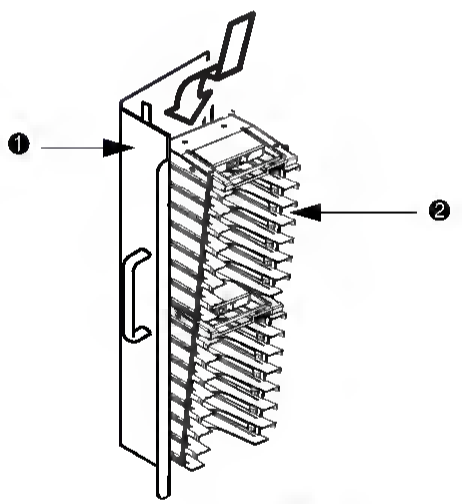
3. Open the appropriate load port door (right or left).

Caution: Ensure that the load port door is open so that the door's clip is not damaged when the load port ejects.

---

4. From the OCP, open the appropriate load port (right or left).
   a. From the **Status** screen, press **Ports**.
   b. Use the **Up** and **Down** buttons to highlight the load port to open, then press **Select**.
   c. When the curser highlights **Open**, press **Select**.

      The display will show a note reminding you to open the load port door. If you have not opened the load port door, do so now.
   d. Press **OK** to continue.
5. With the load port open, place the loaded removable magazine in the library.
   a. Place the base of the removable magazine into an empty location on the panel (see Figure 36).
   b. Push the top of the removable magazine against the panel until it snaps into place.



❶ Empty panel location ❷ Removable magazine

Figure 36: Insert the removable magazine

6. Manually close the load port door by pushing the load port assembly into the cabinet. You will hear a click when it locks into position.

Remove removable magazines

To remove the removable magazines from the library:

1. From the OCP, open the appropriate load port (right or left).
2. Open the appropriate load port door (right or left).
   a. From the **Status** screen, press **Ports**.
   b. Use the **Up** and **Down** buttons to highlight the load port to open, then press **Select**.
   c. When the curser highlights **Open**, press **Select**.

      The display will show a note reminding you to open the load port door. If you have not opened the load port door, do so now.
   d. Press **OK** to continue.
3. When the port is ejected, push down on the handle at the top of the removable magazine.
4. Pull the top of the removable magazine away from the panel.
5. Pull up on the handle at the top of the removable magazine and remove it from the panel.

Note: Yau can safely carry a fully laaded remavable magazine by the handle.

Maintenance and Troubleshooting

3

This chapter describes problems you may encounter during the setup and operation of the library. Corrective information is provided to help you resolve the problems:

- Start-up problems, page 86
- OCP problems, page 87
- Robotics problems, page 88
- Operating problems, page 90
- Tape drive problems, page 91
- Interface Manager card problems, page 92
- FC interface controller problems, page 97
- Maintaining tape cartridges, page 102
- Cleaning tape drives, page 104

Note: Alsa see Sense data values (Hexadecimal), page 140 far infarmatian an values appearing in library errar cades and the errar lag.

Start-up problems

Table 10 describes corrective actions for problems which occur during start-up.

Table 10: Start-up problems

Problem	Corrective Action
The library does not power on.	Verify that: ■ The power cord is connected to a grounded electrical outlet. ■ The power distribution unit's two breaker switches are on (left rear corner of cabinet). ■ The power supply switches are on. ■ The power switch behind the service tray is on.
The library or tape drives are not detected by the Interface Manager or Command View TL software.	■ Verify cable connections and termination. ■ Verify the cabling. ■ Verify that the drives and library are powered on and ready. ■ Ensure that the interface contrallers are powered on and ready.
During initialization, the library reports "not ready."	■ Determine the failure type by checking any previous error codes returned to the host computer, or by getting a library support ticket. ■ Correct the cause of the error.
One or more tape drives fail to spin up during start-up.	■ Verify cable connections and termination. ■ Make sure the OCP does not show the drive power as off. ■ Check that the power supplies are switched on for that level (clusters 0 - 5). ■ Check that the cluster controller is properly cabled and ready.

OCP problems

Table 11 describes corrective actions for OCP problems.

Table 11: OCP problems

Problem	Corrective Action
The OCP is blank.	■ Confirm that power is on. ■ Use Command View TL software or the Interface Manager's command line interface to check for errors on the OCP.
The OCP does not respond to buttons.	■ Use Command View TL software or the Interface Manager's command line interface to check for errors on the OCP. ■ Contact an authorized field service engineer.
An error message is displayed.	■ Write down the details of the error message, including the SK, ASC, and ASCQ numeric values. Look up the code and try the suggested recovery procedures. ■ Press Ok to clear the message.

Robotics problems

Table 12 describes corrective actions for robotics problems.

Table 12: Robotics problems

Problem	Corrective Action
The robot does not move at power on.	■ Make sure all internal packing materials (foam pods, tie wraps, and shipping restraints) have been removed. ■ Check the **Stop** button; make sure the library is on-line and not in the "stopped" mode.
The picker partially grips a tape cartridge.	■ Issue a Move Cartridge command using your application software to move the cartridge from the picker to an empty storage bin. ■ If the problem continues, contact a field service engineer.
The barcode reader fails.	■ Verify that nothing obstructs the reader. ■ Make sure that approved bar-code labels are being used and are correctly applied. ■ Then, restart the library. If the problem continues, contact your service provider.
The robot times out or hangs.	■ Verify that nothing obstructs the robot. ■ Recalibrate the library. ■ Retry the operation. If it still fails, contact a field service engineer.
The robot fails during an operation.	■ Write down the details of the error message, including the SK, ASC, and ASCQ numeric values. Look up the code and try the suggested recovery procedures. ■ Press **Ok** to clear the message.

Table 12: Robotics problems (Continued)

Problem	Corrective Action
The robot drops a cartridge.	■ Open the doors. Retrieve the cartridge, orient it properly, and place the cartridge in an empty storage bin. (Do not try to place the cartridge in the picker.) ■ Perform an inventory. **Note:** If the operator manually places a cartridge in an empty bin, he must then run an inventory so the library records the position of the manually-placed cartridge.
A cartridge is in the picker at start-up, when a move command is requested, or after a place command is executed.	■ If possible, initiate a Move Cartridge command from the picker to a storage slot using your application software. ■ If the problem continues, contact a field service engineer.
The picker does not have a cartridge after completing a pick command.	■ Make sure a cartridge can be found in the source location. ■ Perform an inventory. ■ Retry the command. If the pick operation fails again, contact a field service engineer.

Operating problems

Table 13 describes the corrective action for problems that occur during library operation.

Table 13: Problems during library operation

Problem	Corrective Action
The host computer cannot communicate with the library.	■ Verify that the host computer has been added to the secure manager via the Command View TL software, and has been given access to library components. ■ Verify cable connections and termination. ■ Verify that the FC port link LEDs show good status. ■ Restart the host and the library. ■ If the host and library still are not communicating, verify that there is not a zoning issue.
A tape cartridge (medium) is reported not present.	■ This indicates that the picker could not sense a tape cartridge in a particular storage bin, even though the inventory reports that it is present. ■ Verify that the designated cartridge is present and properly seated. (For a tape drive, make sure the cartridge is completely unloaded.) Then, retry the command. ■ Perform an inventory. ■ If the error persists, contact a field service engineer.
A move command failed.	■ Check the source and destination. The source should hold the cartridge to be moved; the destination should be empty. ■ Make sure the picker is empty and that there are no obstructions. ■ Also, make sure the library is on-line and the Stop button is released. ■ Retry the command.
A flash memory error is reported.	Contact your service provider.
A maximum temperature exceeded warning is displayed.	■ Turn off the library and allow it to cool down. Lower the room temperature, if possible, and increase ventilation around the library. ■ The air filters may need to be changed. ■ If the operating temperature is too high, the library automatically shuts down until the temperature drops.

Tape drive problems

Table 14 describes the corrective action for problems with the tape drives.

Table 14: Tape drive problems

Problem	Corrective Action
The library is unable to communicate with a drive.	This is indicated by a Drive Communication Time-out error. ■ Reseat the drive. ■ Verify that the drive is set to On from the OCP.
The tape drive does not eject a cartridge.	■ Attempt the operation from the application software. ■ Open the front door, and press and hold the eject button on the drive in question. ■ Reset the drive from the OCP then attempt unload. ■ If unsuccessful, power off the library, disconnect the FC cables, power the library back on, open the front door, and press and hold the eject button on the drive in question.

Interface Manager card problems

Table 15 and Table 16 describe the status and network LEDs for the Interface Manager card.

Table 15: Status LED diagnostic codes

Red LED	Green LED	Description
On	Off	BIOS code failed to run.
Blinks 1x per 5 second interval	Off	Hardware POST failed. No firmware images are loaded.
Blinks 2x per 5 second interval	Off	No CompactFlash disk or valid boot sector image found. Be sure to transfer the memory module from the old card to the new card if the Interface Manager was replaced.
Blinks 3x per 5 second interval	Off	Specified firmware image files were not found. Neither the current nor the previous image was found.
Blinks 4x per 5 second interval	Off	Load or execute command failed (boot code remains at end of process). This indicates that load, decompress, or execution failed on both the current and previous image files.
Off	Blinks 1x per 5 second interval	Normal state. Load or execute command succeeded. Boot code successfully loaded, decompressed, and initiated execution of one of the image files.

Table 16: Network link activity/speed LEDs

LED	Status	Description
Link Activity LED (left side of each Ethernet port)	Off	Port disconnected / no link
	On	Port connected to another Ethernet device
	Flashing	Data is being transmitted / received
Link Speed LED (right side of each Ethernet port)	On	Port is operating at 100 Mbps
	Off	Port is operating at 10 Mbps, or port is not connected (see Link Activity LED)

Table 17 describes common symptoms relating to the Interface Manager card and how to resolve them.

Table 17: Common Interface Manager issues

Symptom	Possible Cause	Solution
Command View TL server does not detect the Interface Manager card	Bad network connection	■ Verify that the Interface Manager card and the management station are correctly connected to the LAN. ■ Use LEDs to troubleshoot Ethernet cabling. ■ Ping the Interface Manager to verify network health.
	Interface Manager card not powered on or in ready state	■ Power on the library. Observe status and link LEDs. ■ Interface Manager must be at firmware I120 or higher on an ESL E-series library. ■ Interface Manager must be at firmware I130 or higher if connected to an e2400-FC 2G.
	Incorrect IP address	Verify that the correct IP address of the Interface Manager card is entered in Command View TL. ■ See the *HP StorageWorks ESL E-Series Unpacking and Installation Guide* for information on obtaining the correct IP address using the OCP. ■ Configure Command View TL with the correct IP address.See the *HP StorageWorks Interface Manager and Command View TL User Guide* for information on adding a library or visit http://www.hp.com/support/cvtl.

Table 17: Common Interface Manager issues (Continued)

Symptom	Possible Cause	Solution
Interface Manager card does not detect one or more FC interface controllers	Bad network connection	■ Verify that the Interface Manager card is properly connected to the FC interface controllers and that the cables are good. ■ Use LEDs to troubleshoot Ethernet cabling. ■ See the *HP StorageWorks ESL E-Series Unpacking and Installation Guide* for more information.
	Incorrect interface controller, or controller has less than minimum required firmware	Make sure that the e2400-160 interface controller has lettering to the side of the ports. If lettering is above or below the ports, then the wrong controller type was installed. Contact your service provider. **Note:** If you have the wrong controller type, it might still work if the firmware level is at least 5.3.06, the controller is set to DHCP, and its defaults are restored. Update the firmware to 5.3.06 or higher and restore defaults on the interface controller (e2400-160 or e1200-160)
	Defective Interface Manager card or FC interface controller	Observe status and link LEDs. Replace defective card or controller.

Table 17: Common Interface Manager issues (Continued)

Symptom	Possible Cause	Solution
Interface Manager card does not detect drives or library	SCSI cables not connected properly	Check cabling connections.
	SCSI settings or termination not set properly	■ Check the SCSI settings for the device. ■ Check that the SCSI bus is properly terminated and ensure the terminator LEDs indicate a normal state (green).
	Timing issues	Reset the corresponding FC interface controller.
	Drive not powered on or in ready state	■ Make sure the drive isn't set to off. ■ Troubleshoot the drive.

Table 17: Common Interface Manager issues (Continued)

Symptom	Possible Cause	Solution
Command View TL does not run in the browser	Incompatible browser version or Java support not enabled	■ Make sure you are using a minimum of Microsoft Internet Explorer v6.0 SP1 or later, or Netscape Navigator v6.2 or later. ■ Make sure that Java support is enabled in the browser.
	Java Runtime Environment (JRE) not installed	Download and install the Java 2 Platform, Standard Edition v1.42 or later from http://wwws.sun.com/software/download/technologies.html.
	Bad network connection or network down	■ Check all physical network connections. If the connections are good, contact your network administrator. ■ Ping the management station. If pinging fails and the IP address is correct, contact your network administrator.
	Wrong IP address	Check the IP address of the management station. On the management station, open a command shell and enter ipconfig. You must use this IP address (or the network name of the management station) in the URL to access Command View TL.
	Management station not running, or Command View TL service not running on management station.	■ Check to see if the management station is operational. ■ Use the Services applet to verify that the Command View TL service is running on the management station. Click **Start > Settings > Control Panel > Administrative Tools > Services**.

FC interface controller problems

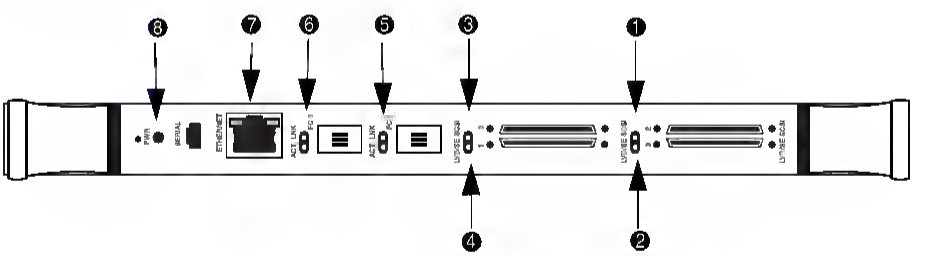
Most problems occur during the initial installation of the interface controller. Before proceeding with advanced troubleshooting techniques, verify all connections and review the configuration.

LED indicators

The LED indicators on the e2400-160 FC and e2400-FC 2GB interface controllers are useful for diagnosing various problems:

- ***SCSI bus* LEDs (e2400-160 FC interface controller only)** — indicate SCSI activity. These indicators are lit during power on, configuration, and when the unit is transferring data. If the SCSI indicator stays continually lit without any corresponding FC LED activity, it may indicate a problem with the SCSI bus configuration. Verify the SCSI bus configuration.
- ***FC port* LEDs** — indicate FC activity (ACT) and link (LNK) status. If the link LED does not light it may indicate a problem with a FC link. Verify the FC port configuration and cabling.
- ***Ethernet* LEDs** — indicate activity and link status. If one of these indicators does not light or stays continuously lit, it may indicate a problem with the network connection or cabling. Verify the network connection. The port must be connected to a 10/100BaseT Ethernet network to function properly.

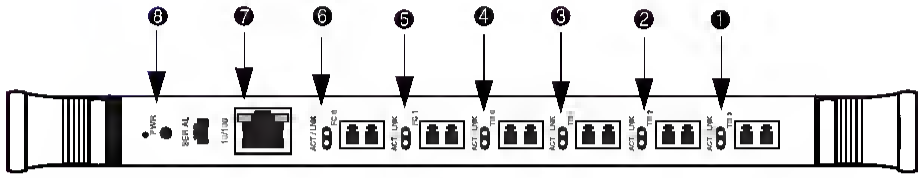
See Figure 37 for LED locations and functions on the e2400-160 FC interface controller.



❶ SCSI bus port 2 LED
❷ SCSI bus port 3 LED
❸ SCSI bus port 0 LED
❹ SCSI bus port 1 LED
❺ FC port 0 LED
❻ FC port 1 LED
❼ Ethernet port LED
❽ Interface controller LED

Figure 37: e2400-160 FC interface controller illustration

See Figure 38 for LED locations and functions on the e2400-FC 2GB interface controller.



❶ FC drive part TD3 LED
❷ FC drive part TD2 LED
❸ FC drive part TD1 LED
❹ FC drive part TD0 LED
❺ External port FC1 LED
❻ External port FC0 LED
❼ Ethernet part LED
❽ Interface contraller LED

Figure 38: e2400-FC 2GB interface controller illustration

Basic troubleshooting

Simplify the installation by reducing it to the most basic configuration. Then, add elements one at a time, verifying the operation after each step.

Basic troubleshooting includes verifying the setup and the connections, including:

- Verifying SCSI bus configuration
- Verifying FC port connection
- Verifying FC and SCSI devices in Windows NT
- Verifying the interface controller configuration
- Verifying devices
- Verifying host configuration
- Verifying HBA device driver information
- Verifying serial port configuration

Each of these topics is discussed in the following sections.

Verifying SCSI bus configuration

Items to check include:

- **Termination** — Problems with termination can cause intermittent or hard failures. A SCSI bus must be terminated on both ends. Termination problems are common when both narrow and wide devices are on the same bus.
- **Bus Type** — On an LVD SCSI bus, SE and LVD devices can be connected to the same bus. However, if one SE device is detected during power on, communication to all devices converts to SE mode.
- **Device ID** — Each device on a SCSI bus must have a unique ID. Verify configured IDs are not in use by other devices on the same SCSI bus.
- **Cabling** — Check SCSI cables to verify they are functional. SCSI rules for total length, distance between devices, and stub length must be followed. Connections should also be checked and reseated if necessary.
- **SCSI Devices** — Verify that the SCSI devices on a particular SCSI bus can be seen in the Configuration Menu of the FC interface controller. If the FC interface controller cannot see the devices, verify SCSI configuration, cabling, and termination.

Verifying FC port connection

If SCSI devices are recognized on the SCSI buses, but do not appear to the FC host, it may be that the FC link is not properly established. Most hubs and switches have link indicators showing link status. When the FC interface controller is connected and powered on, this link indicator should be solid. If it is not, check the cabling or connections.

One method of verifying link integrity when connected to a functional host, involves disconnecting and then reconnecting the FC cable. This procedure should cause momentary activity of this indicator as the link reinitializes.

Additionally, verify that the cable type of the FC interface controller and the attached hub, HBA, or switch is of corresponding types. When using optical media, verify that the attached device is using non-OFC type optical devices.

Note: By default, the FC port speed is set to 2 Gb/s. Changes to the FC port speed must be manually set, such as for 1 Gb/s. If set incorrectly and the FC interface controller is plugged into a Loop or Fabric, the unit may receive framing errors, which can be found in the trace logs, and the fiber link light will be off because of the incorrect FC link speed.

Verifying FC and SCSI devices in Windows NT

When mapping FC and SCSI devices, verify the FC and SCSI devices are recognized by the FC interface controller.

Windows NT may need to be rebooted with all SCSI devices and the FC interface controller powered on before recognizing the devices.

To verify the FC and SCSI devices:

1. Navigate to the Windows NT Control Panel, and select **SCSI Adapters**.
2. Double-click the FC HBA.

   The SCSI devices should be listed.

   If no devices are listed, verify the FC interface controller configuration, FC HBA configuration, and cabling.

   If devices are listed, verify the FC HBA mapping mode or the AL_PA addresses.

Verifying the interface controller configuration

Verify the following:

- The FC interface controller speed is set correctly
- The connection type is set correctly
- The host is added to Secure Manager and given permission to communicate with the library.

Verifying devices

HP recommends using Command View TL to verify that the devices are functional.

Verifying the host configuration

In some cases, the FC HBA or host device driver may not be working properly. Check the configuration of these elements.

It may be useful to check the release notes for the device driver to see if there are any specific issues or a required configuration. It may also be useful to ensure that the current version of the HBA driver is being used.

Older applications can have expectations about what constitutes a valid SCSI ID, and thus may not correctly handle certain mappings. This is not an issue for the operating system or most applications. However, some applications may exhibit difficulties addressing target IDs greater than 15 (16 and higher.) To resolve this situation in a direct attach configuration, configure the FC interface controller to use hard addressing and set the AL_PA to a value that the HBA will be able to map with an ID less than 16.

Verifying HBA device driver information

Review the HBA device driver *Readme.txt* file for configuration specifics. An HBA may require a different configuration. HBAs typically come with utility programs to view or change their configurations.

Verifying serial port configuration

If you are having problems connecting via the serial interface, verify the configuration of the terminal or terminal emulation program.

Table 18: Terminal configuration settings

BAUD Rate	Autoboud, 9600, 19200, 38400, 57600, 115200
Data Bits	8
Stop Bit	1
Parity	None
Flow Control	None or XON/XOFF

If problems persist, verify the cabling.

If a valid Ethernet IP address is configured, serial configuration settings can also be set via Telnet.

Maintaining tape cartridges

Note: In addition to the information provided in this manual, access the *HP StorageWorks SDLT Tape Drive Reference Guide,* and the *HP StorageWorks Ultrium Tape Drive User's Guide* from http //www.hp.com/support for more information.

For longer life of recorded or unrecorded tape cartridges:

- Do not carry cartridges loosely in a container that exposes them to unnecessary physical shock. Dropping or bumping cartridges may dislodge and damage internal components.
- Store tape cartridges vertically in their protective cases until needed. Store tape cartridges in a clean environment that duplicates the conditions of the room in which they will be used.
- Use tape cartridges in temperatures between 50°F to 104°F (10°C and 40°C).
- If a tape cartridge has been exposed to extreme heat or cold, stabilize the tape cartridge at room temperature for the same amount of time it was exposed for up to 24 hours.
- Keep cartridges out of direct sunlight and do not place tape cartridges near electromagnetic interference sources, such as terminals, motors, and video or X-ray equipment. Doing so may cause data on the tape cartridge to be altered or erased.
- Do not touch the tape medium or open the tape door unnecessarily. Dust and skin oils can contaminate the tape, impact performance, and cause damage.
- Store tape cartridges in a dust-free environment where the relative humidity is between 20 percent and 80 percent. For longer tape cartridge life, store the tape cartridge at 40 percent to 60 percent relative humidity.
- Use only HP qualified bar code labels. Apply them only in the designated areas of the tape cartridge, and do not apply more than one per cartridge.
- Follow guidelines provided by the tape cartridge manufacturer.

If a tape cartridge is dropped or damage is suspected, gently shake the tape cartridge:

- If it rattles, it is damaged. Restore the data on the tape cartridge if possible and discard the damaged tape cartridge.

- If it doesn't rattle, check the tape leader inside the cartridge. To do this, open the door on the rear of the tape cartridge by releasing the door lock. The tape leader should be visible at the top-left of the tape cartridge.

Caution: Do not touch the tape leader or the tape medium. Dust or skin oils can contaminate the tape, impact performance, and cause damage.

Cleaning tape drives

Use the guidelines in the following sections to clean your tape drives.

Cleaning SDLT tape drives

Be aware of the following:

- Under normal conditions, the cleaning cartridge is effective for about 20 cleanings.
- SDLT tape drives typically do not need regular cleaning, as their design allows for minimal head contamination.
- Use the cleaning tape only if the library indicates that the drive needs cleaning.
- Use the cleaning tape more than once if a tape has severely contaminated the drive heads. If the problem persists after two cleanings, and the cleaning tape has not expired, contact your authorized service provider.

Note: Do not use a DLT, DLT1, or VS cleaning tape (almond in color) in an SDLT drive. SDLT cleaning tapes are gray and use a 7- or 8-character bar code label, CLNxxxS or CLNxxxS1.

To clean the tape heads:

1. Move a cleaning cartridge into the drive using your application software. The tape drive automatically loads the cartridge and cleans the heads.

   During the cleaning cycle the drive's green **Ready** LED flashes. At the end of the cleaning cycle, the drive ejects the cartridge.

2. Remove the cleaning cartridge from the drive.

Cleaning Ultrium tape drives

Be aware of the following:

- Ultrium tape drives have been developed to have a minimal cleaning requirement.
- An HP Ultrium Universal Cleaning Cartridge can be used up to 50 times. If you are using an older HP Ultrium cleaning cartridge, check the documentation that came with your media.

Caution: Only use HP Ultrium Universal Cleaning Cartridges in Ultrium tape drives.

- If the cleaning cartridge is ejected immediately, then it has expired or is not an Ultrium cleaning cartridge. Discard it and use a new one.

To clean the tape heads:

1. Move a cleaning cartridge into the drive using your application software. The tape drive automatically loads the cartridge and cleans the heads. The cleaning cycle can take up to five minutes.
2. Move the cleaning cartridge back to the proper storage bin using your application software.

Library Characteristics

This appendix lists characteristics and specifications of the library. These characteristics and specifications are categorized as follows:

- Physical specifications and requirements, page 108
- Performance and reliability characteristics, page 109
- Environmental specifications, page 110

Note: Tape drive and media specificatians are described in "Tape drives" an page 24.

Physical specifications and requirements

Table 19 and Table 20 provide dimensions and other physical characteristics of the library unit.

Table 19: Physical characteristics

Library Dimensions and Weight	
Width	30 in. (76 cm)
Depth	48 in. (122 cm)
Faatprint	30 x 48 in. (76 x 122 cm)
Height	75 in. (191 cm)
Weight	Fully laaded library: 1700 lbs. (771 kg) Drives: 13.5 lbs. (6.12 kg) each Cartridges: 7.7 az. (2.18 kg) each
Tape Drives and Cartridges	
Tape Drives, Max. Na.	Up ta 24 tape drives
Cartridges, Max. Na.	630 SDLT tapes/712 Ultrium tapes

Table 20: Interfaces

Hast ta Library Interfaces	
Saftware	SCSI-2 medium changer cammand set
Pawer Input	
Power card	1 ar 2 standard US C19 ta NEMA L6-20P rated at 250 VAC and 16 amps
Hast ta Tape Drive Interface	
Saftware	SCSI-2

Note: Far HP StarageWarks FC Interface Cantraller specificatians, refer ta the dacumentatian that shipped with yaur cantraller.

Performance and reliability characteristics

Table 21 and Table 22 list performance and reliability characteristics of the library.

Table 21: Performance characteristics

Average Swap Time	18 to 20 seconds, consisting of two Move Medium commonds
Inventory	Less thon 3 minutes, fully looded with lobeled cortridges

Table 22: Reliability characteristics

MTBF	250,000 power-on hours
MSBF	1 million lood/unlood cycles
MTTR	Less thon 30 minutes

Note: Tope drive ond medio specificotions ore described in "Tope drives" on poge 24.

Environmental specifications

Table 23 provides various library environmental specifications.

Table 23: Environmental specifications

Power Environment		
Electrical inputs	Voltage	200 VAC to 240 VAC
	Rated Frequency	50/60 Hz
	Rated Current	8A
	Power consumption	VA max 1600W
	Electrical connection to power	IEC 320 C19 male connector inside back door
Climatic Environment		
Temperature (operating)	Dry Bulb	15°C to 32°C (59°F to 90°F)
	Wet bulb	25°C (77°F) maximum
	Thermal transition	11°C per hour
Temperature (shipping and storage)	Dry bulb	-40°C to 66°C (-40°F to 151°F)
	Wet bulb	46°C (115°F) maximum
	Thermal transition	30°C (54°F) per hour
Relative humidity	Operating	20% to 80%, non-condensing
	Shipping and storage	5% to 95%, non-condensing
Altitude	Operating	Sea Level to 10,000 ft. (3,048 m)
	Shipping and storage	Sea Level to 12,000 ft. (3,657 m)
Heat dissipation	Operating	5500 BTU/hr (1400 KCal/hr or 1600 watts)
Direct ESD	Contact discharge	up to 4.0 kV to all external metal panels and doors
	Air discharge	up to 8.0 kV to the front GUI display

Table 23: Environmental specifications (Continued)

Sound power level	Operating Idle	7.6 Bel 7.8 Bel
Sound pressure @ operator	Operating	5.5db

Relocating the Library

B

Caution: HP strongly recommends that an HP authorized service representative relocate a library to another location.

This appendix explains how to relocate the library. As used in this appendix, the term *relocate* means either to ship the library or simply to move it to a nearby location (for example, from one area in a building to another).

The instructions in this appendix are divided into the following sections:

- Checking the new installation site, page 114
- Preparing the library for relocation, page 115
- Crating the library, page 125
- Preparing the library for operation, page 128

To ship the library or move it using a motor vehicle (for example, truck, or forklift), follow all of the instructions in this appendix.

To move the library to a new location within the same building or facility, follow all instructions in this appendix except for those found in "Crating the library" on page 125.

Note: These procedures require the original packing materials of the library. If you do not have the original packing materials, contact your support representative.

Caution: Moving or shipping the library without proper packing materials can result in damage to library components.

Checking the new installation site

Check the new installation site for the library using the guidelines found in the *HP StorageWorks ESL E-Series Pre-Installation Site Survey Instructions*. Make sure the new location meets all applicable clearance, environmental, and power requirements.

Preparing the library for relocation

To prepare the library for relocation:

- Removing tape cartridges, page 115
- Installing shipping restraints and packing, page 116
- Disconnecting library cables, page 123

Caution: Always prepare the library for relocation before any move.

Removing tape cartridges

To remove tape cartridges:

1. Unload all tape cartridges from the tape drives using your application software.
2. Press **Stop** on the OCP to stop all library operation.

   This places the library off-line after the completion of any currently executing operations.
3. Power the library off.
4. Unlock and open both front doors.
5. Remove all tape cartridges from the library bins.
6. Carefully pack all tapes for shipment.

Installing shipping restraints and packing

To install internal shipping restraints:

1. Remove the six panel shipping restraints (three sets on each side) from their storage location on the lower cabinet frame (see Figure 39).

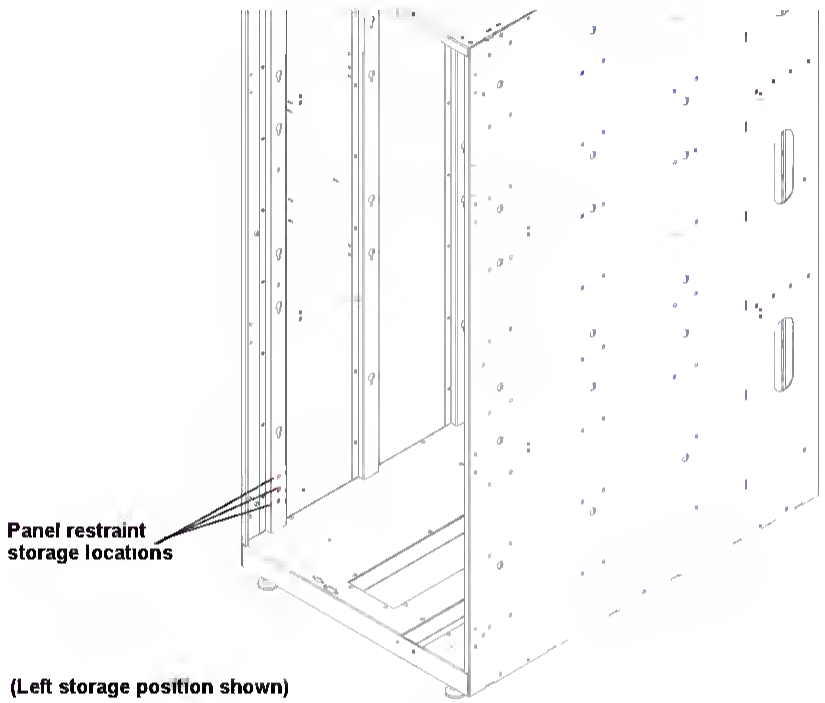


Figure 39: Retrieving the panel shipping restraints

2. Attach the six panel shipping restraints (three on each side) with a 7/16-in socket wrench (see Figure 40).

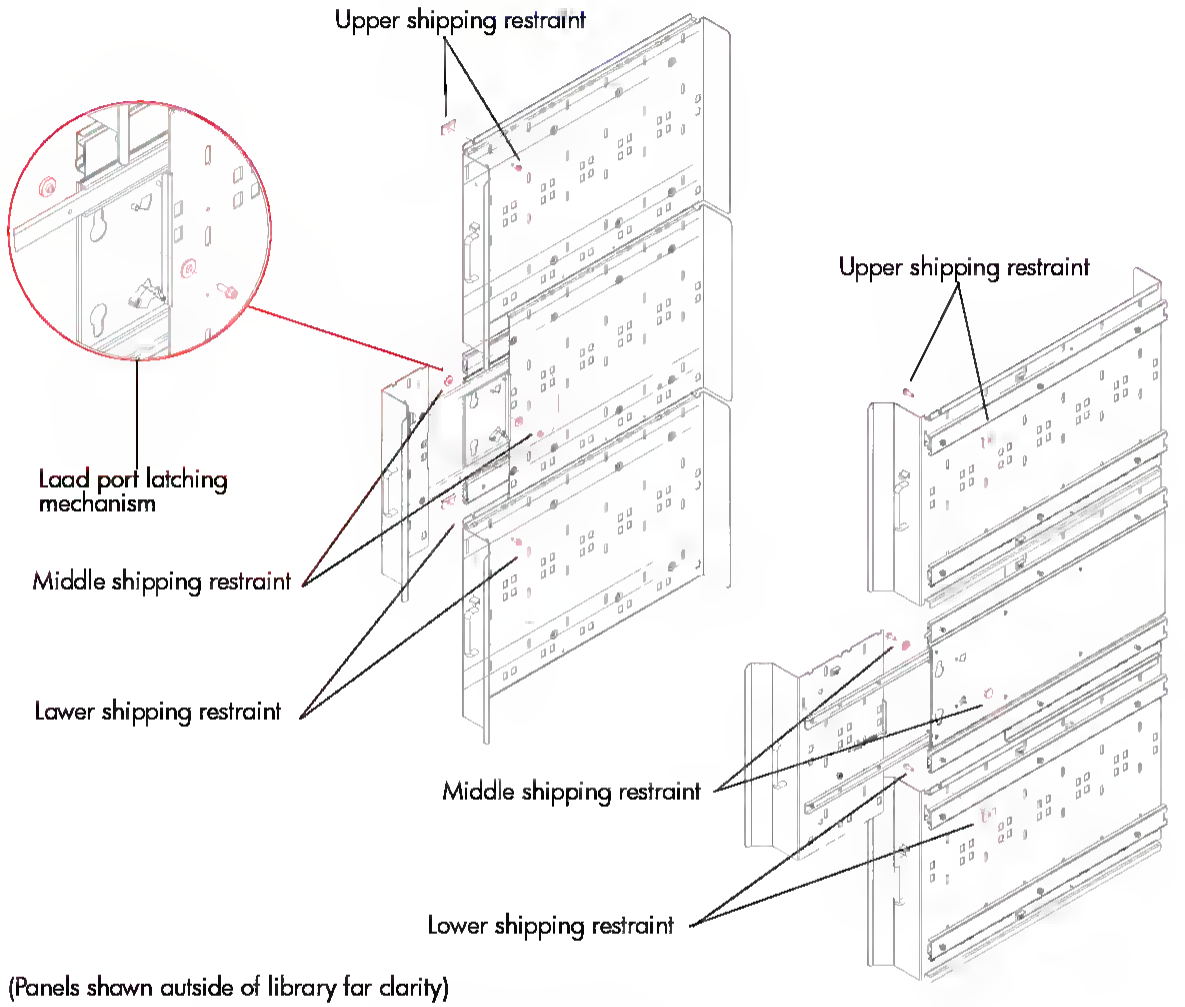


Figure 40: Attaching the panel shipping restraints

3. Remove the robot shipping restraints from their storage location under the left cartridge bin panel (see Figure 41).

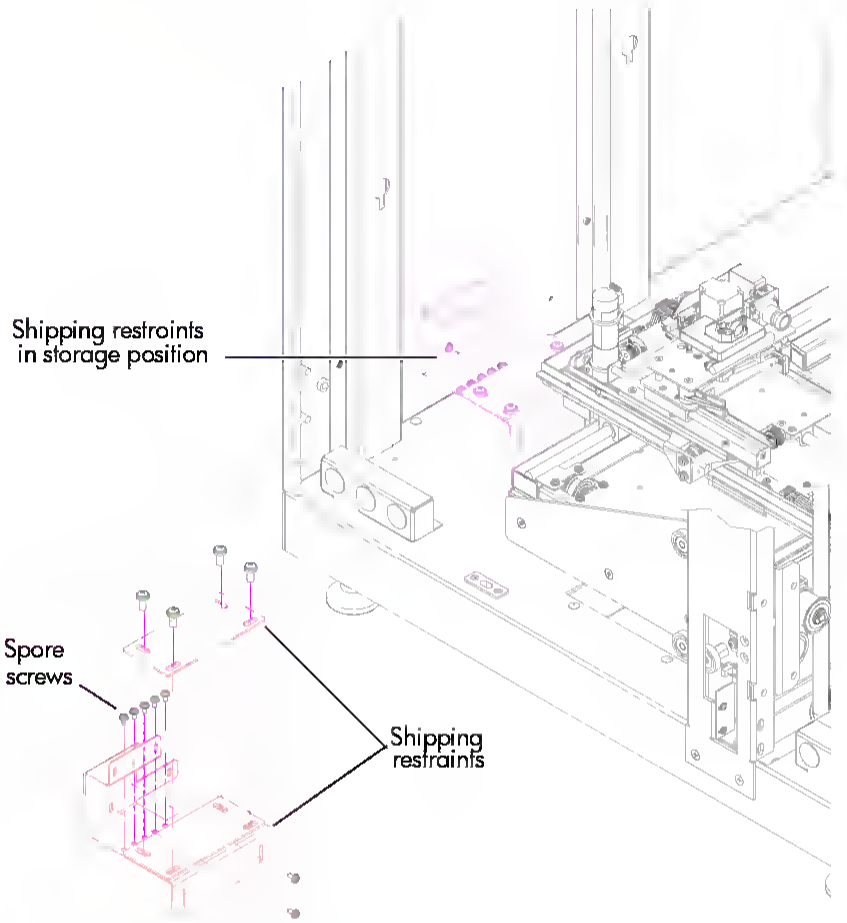


Figure 41: Shipping restraints - storage location

4. If the picker is not in the far right position, gently move it along the horizontal carriage until it is as far front as possible.

5. Install the robotic shipping restraints (see Figure 42).

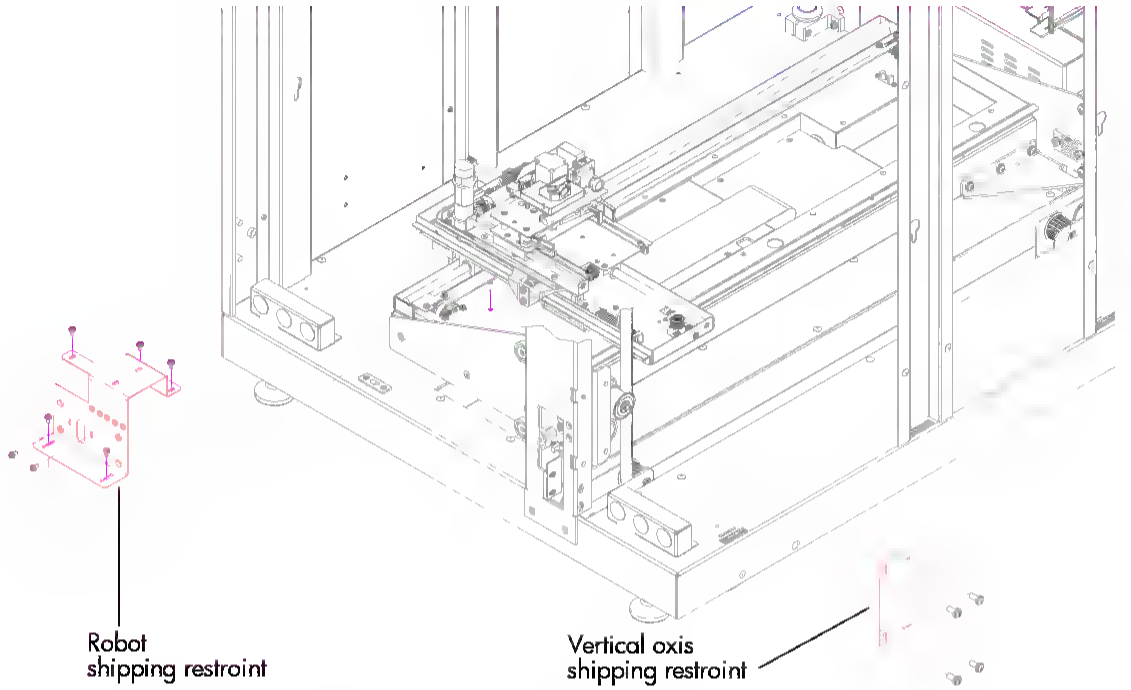


Figure 42: Installing the robotic shipping restraint

6. Install the counterweight (see Figure 43).

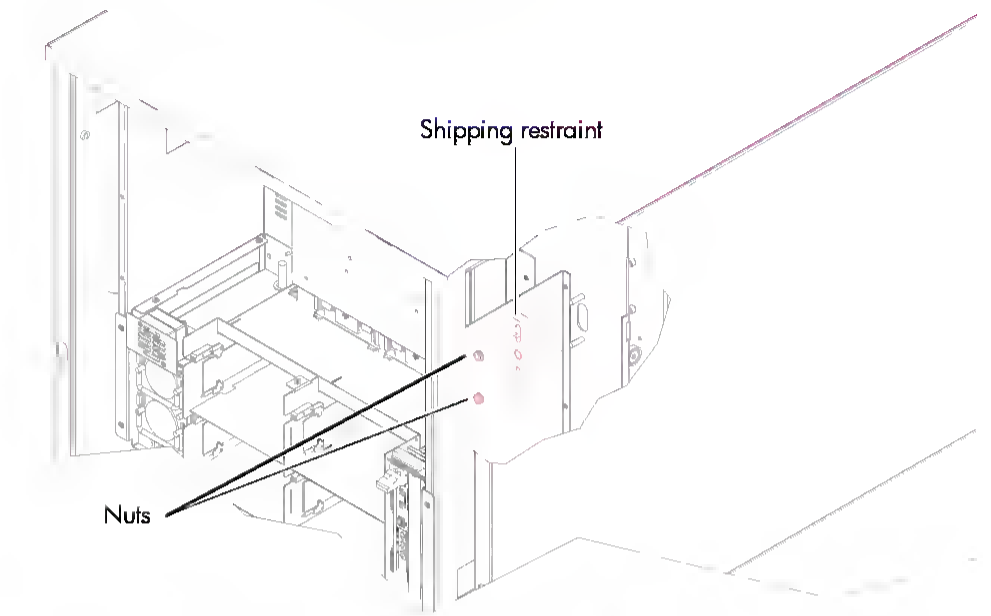


Figure 43: Installing the counterweight shipping restraint

7. Locate the two sheet metal pieces that form the internal library frame restraint and insert them as shown in Figure 44.

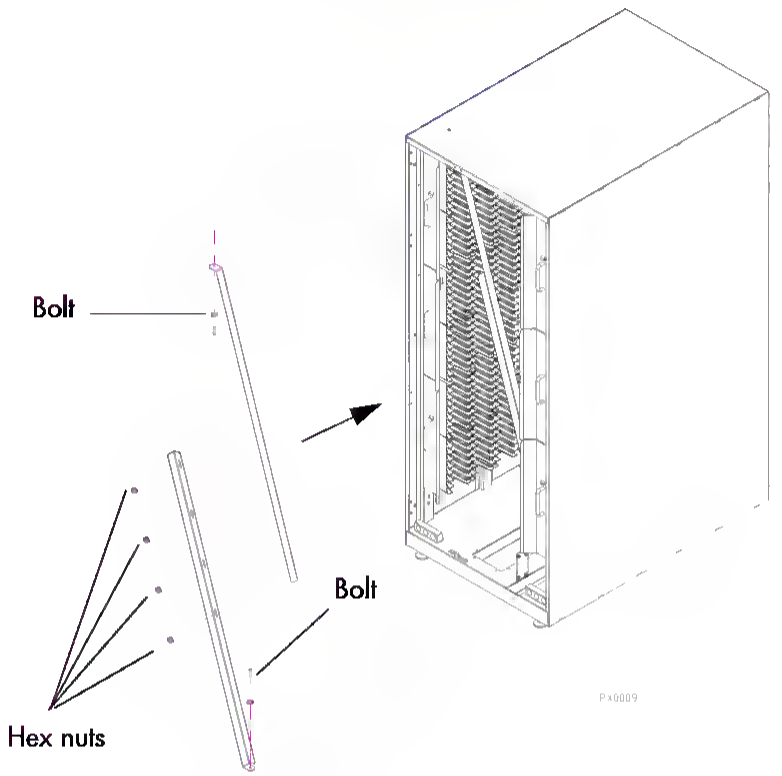


Figure 44: Installing the internal library frame restraint

8. Attach the two pieces together using four 1/4-inch hex nuts.
9. Secure the restraint to the frame with two 1/4-inch bolts, one at the top and one at the bottom of the library frame.

10. From the front of the library, add the foam to the Y-axis cover plate, to the left front door, and also to the back door frame (see Figure 45).

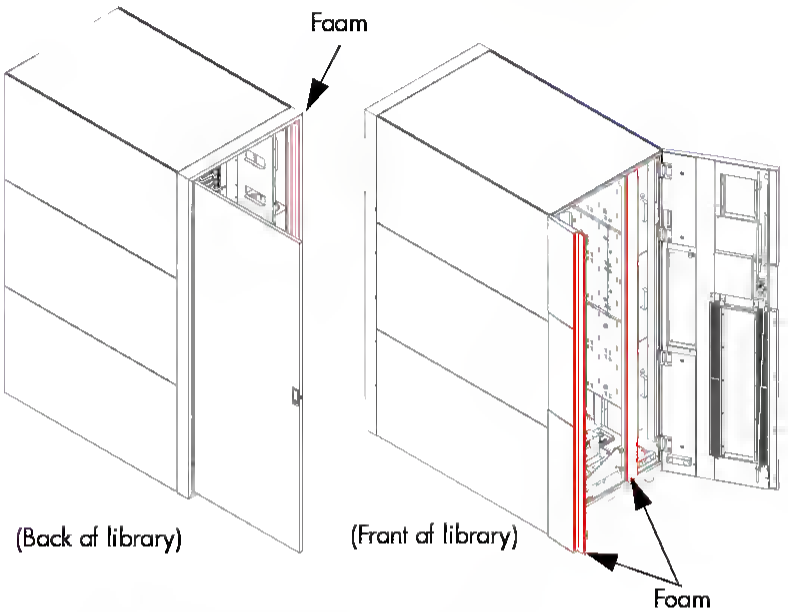


Figure 45: Adding the shipping foam inside the library

11. Close the library doors and add shipping foam to the bottom of the library perimeter (see Figure 46).

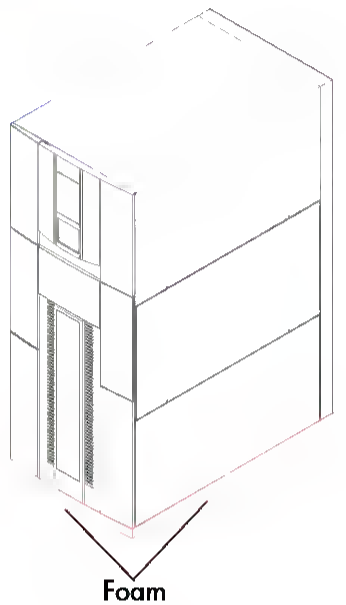


Figure 46: Adding the shipping foam to the library perimeter

Disconnecting library cables

To disconnect library cables:

1. Disconnect the FC cables connecting from the library to the host.
2. Disconnect the Ethernet cable connecting to the local network.
3. Disconnect the power cord from the library to its power source.
4. Pack the cables removed in step 1 through step 3 with other library accessories.
5. Disconnect the following cables but leave them routed in the channel:
   - Drive cluster and card cage power cables
   - Drive cluster Ethernet cables
   - Drive cluster I2C cables

- Drive SCSI cables (not present on Ultrium 460-FC or 960 drives)
- Drive FC cables (not present on SCSI drives)
- Cabinet controller SCSI cable
- Robotics controller card (eI200-160) Ethernet cable
- e2400-160 or e2400-FC 2GB interface controller Ethernet cables
- Interface Manager card Ethernet cable

Crating the library

Use this section if you need to:

- Ship the library to the new site.
- Transport the library by forklift or similar means.

If you are moving the library within a facility, refer to "Preparing the library for operation" on page 128.

WARNING: The library weighs appraximately 1700 lb. (771 kg). Use at least twa peaple ta perfarm any steps that invalve lifting ar guiding the library.

ADVERTENCIA: El pesa apraximada de la bibliateca es de 771 kg. Utilice cama mínima das personas para llevar a cabo cualquiera de las pasas que impliquen la elevación a conducción de la bibliateca.

VORSICHT: Die Library wiegt ca. 771 kg (1.700 lb). Daher müssen alle Schritte, die das Anheben oder das Führen der Tape Library erfardern, van mindestens zwei Personen durchgeführt werden.

AVVERTENZA: La libreria pesa circa 771 KG. Utilizzare almena due persane per eseguire qualsiasi aperaziane di sallevamenta a di spostamenta della libreria.

警告 ： ライブラリの重さは約771Kg あります。ライブラリを持ち上げたり、移動したりする場合は、少なくとも 2 人以上で作業してください。

WAARSCHUWING: De library weegt angeveer 771 kg. Als de library maet warden apgetild af voortbewogen, daet u dat dan altijd met twee persanen.

To crate the library for a new site (see Figure 47).

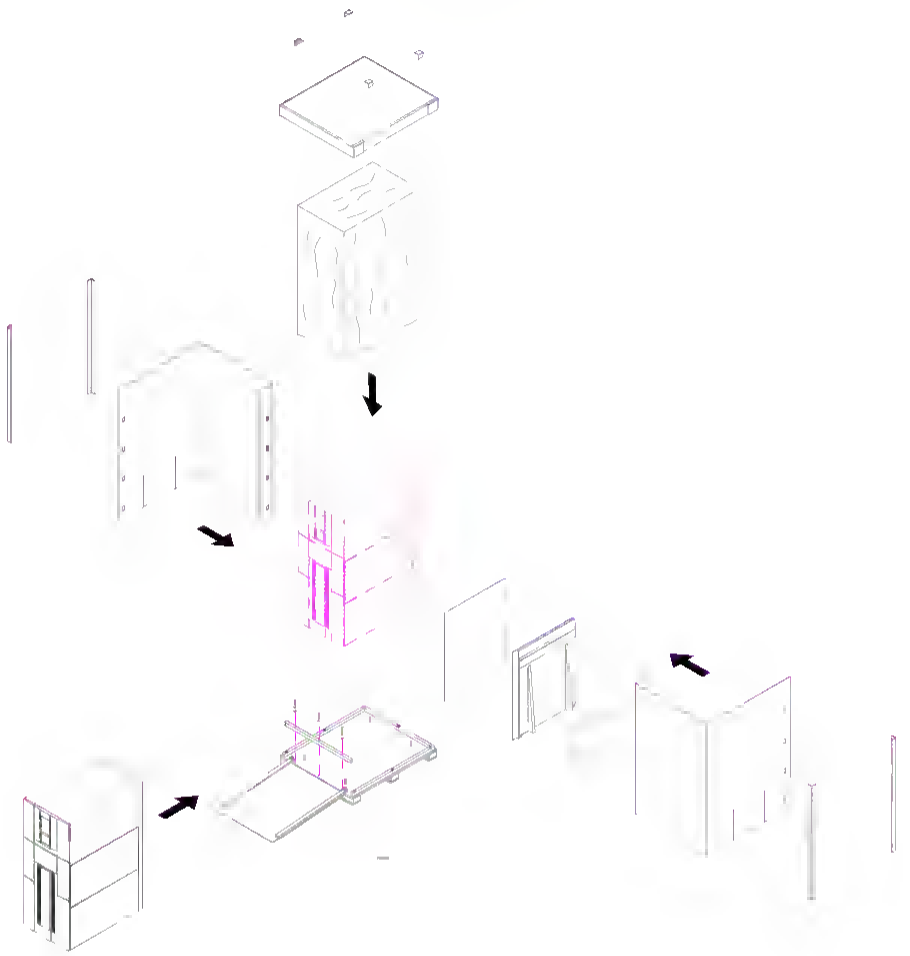


Figure 47: Crating the library

1. Prepare the shipping pallet for the library by attaching the ramp to the pallet.
2. Place the library on the pallet
   a. Raise the library support feet.
   b. With the help of at least one person, roll the library to a position in front of the pallet ramp.
   c. Roll the library onto the pallet.

3. Secure the library.
   a. Place the shipping bag over the library, and secure it into place.
   b. Use the four shipping bolts to secure the library to the pallet.
   c. Remove the ramp from the pallet and lean it against the side of the library with a cardboard sheet between the library and the ramp.
4. Place the accessory kits onto the pallet.
5. Place the foam cap over the library.
6. Wrap the cardboard crate around the library and fasten it using the plastic restraining clips.
7. Place the top onto the crate.
8. Secure the crate with two steel restraining bands.

Preparing the library for operation

After shipping or moving the library, refer to the *HP StorageWorks ESL E-Series Pre-Installation Site Survey Instructions* and the *HP StorageWorks ESL E-Series Unpacking and Installation Guide* to:

- Prepare the new installation site
- Receive the library
- Uncrate the library
- Position the library
- Install and configure the library

Note: The ESL E-Series library must be unpacked and installed by autharized HP service personnel anly.

Regulatory Statements

C

FCC statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Any changes or modifications made to this equipment may void you's authority to operate this equipment.

Operation of this equipment in a residential area may cause interference in which case you at your own expense will be required to take whatever measures may be required to correct the interference.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

BSMI statement

警告使用者:

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Japan statement (VCCI)

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Japan statement (AC power cords)

製品には、同梱された電源コードをお使いください。
同梱された電源コードは、他の製品では使用出来ません。

Industry Canada (digital apparatus)

Reference: *Interference-Causing Equipment Standard*, ICES-003 Issue 2

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Reglément sur le matériel brouilleur du Canada.

CISPR-22 WARNING!

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

ACHTUNG!

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmassnahmen verantwortlich ist.

ATTENTION!

Ceci est un produit de classe A. Dans un environment domestique, ce produit peut causer des interférences radioélectriques. Il appartient alors à l'utilisateur de prendre les mesures appropriées.

Notice for USA and CANADA only

If shipped to USA, use the UL LISTED power cord specified below for 200-240 V operation. If shipped to Canada, use the CSA CERTIFIED power cord specified below for 200-240 V operation.

- Plug Cap: NEMA twist-lock plug with ground pin (NEMA L6-20P configuration)
- Cord Type: SJT, three 12 AWG (3 x 2.50 mm^2) or 18 AWG (1.0 mm^2) wires
- Length Maximum: 15 feet (4.5m)
- Rating Minimum: 25 A, 125 V

ATTENTION

LIRE LA REMARQUE DANS LE MODE D'EMPLOI.

REMARQUE

CETTE REMARQUE NE CONCERNE QUE LES ÉTATS-UNIS ET LE CANADA.

En cas d'envoi aux États-Unis, utiliser le cordon d'alimentation CERTIFIÉ UL et convenant pour 200-240 V.

En cas d'envoi au Canada, utiliser le cordon d'alimentation CERTIFIÉ CSA et convenant pour 200-240 V.

- Fiche: Broches parallèles avec une broche de mise à la terre (configuration NEMA L6-20P)
- CordonType: SJT, trifilaire 12 AWG (3 x 2.50 mm^2) ou 18 AWG (1.0 mm^2)
- Longeur Maximum: 15 pieds (4.5m)
- Capacité Minimum: 25A, 125 V

Laser statement

Class 1 laser product

WARNING: With all panels and enclosures in place, this product is roted as a Class I laser product. The bar code scanner inside this product, however, is a Class II laser. Avoid exposure to the laser light emitted from the bar code scanner. Do not stare into the beam.

WARNING: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous exposure.

Laser klasse 1

VORSICHT: Wenn alle Blenden und Speichereinheiten ordnungsgemäß eingebaut sind, ist dieses Produkt als Laserprodukt der Klasse I eingestuft. Bei dem Barcode-Scanner in diesem Produkt handelt es sich dagegen um einen Laser der Klasse II. Setzen Sie sich und andere nicht dem vom Barcode-Scanner emittierten Laserlicht aus. Schauen Sie nicht direkt in den Strahl.

Die in diesem Handbuch beschriebenen Bedienungs-, Einstellungs- und Verfahrenshinweise müssen befolgt werden, da es andernfalls zum Austritt gefährlicher Strahlung kommen kann.

Appareil à laser de classe 1

AVERTISSEMENT : Lorsque tous les panneaux et boîtiers sont en place, ce produit est classé dans la catégorie des produits laser de classe I. Le scanner de code-barres à l'intérieur de ce produit est toutefois un laser de classe II. Évitez toute exposition au rayonnement laser émis par le scanner de code-barres. Ne regardez pas directement le faisceau laser.

L'utilisation des commandes ou les réglages de performances des procédures autres que ceux spécifiés dans le présent document peuvent entraîner un risque d'exposition.

Producto láser de clase 1

ADVERTENCIA: Con todos los paneles y receptáculos en su ubicación, este producto es clasificado como producto láser de Clase I. Sin embargo, el escáner de código de barras que se encuentra de este producto es de Clase II. Evite la exposición a la fuente luminosa del láser que emite el escáner de código de barras. No mire al rayo.

El uso de controles o ajustes de procedimientos diferentes de los especificados en este documento pueden resultar en una exposición peligrosa.

Luokan 1 laserlaite

ATTENZIONE: Quando tutti i pannelli e i contenitori sono in posizione, questo prodotto è classificato come prodotto laser di Classe I. Lo scanner di codice a barre all'interno del prodotto, tuttavia, è un laser di Classe II. Evitare l'esposizione alla luce laser emessa dallo scanner del codice a barre. Non dirigere lo sguardo verso il raggio laser.

L'utilizzo di controlli, regolazioni o prestazioni di procedure diverse da quelle specificate qui può essere pericoloso.

Battery statement

WARNING: This product contains a Lithium battery. The Panasonic BR1225 on the motherboard contains a Lithium battery. Lithium may be considered a hazardous material. Dispose of this battery in accordance with local, state, and federal laws.

LET OP

WAARSCHUWING: Dit product bevat een lithiumbatterij. De Panasonic BR1225 op het moederbord bevat een lithiumbatterij. Lithium kan worden beschouwd als chemisch afval. Deze batterij dient te worden verwerkt overeenkomstig de plaatselijke en/of landelijke wetgeving.

VAROITUS

VAROITUS Tässä tuotteessa on litiumparisto. Emolevyllä oleva Panasonic PR1225 sisältää litiumpariston. Litium saattaa olla luokiteltu vaaralliseksi aineeksi. Hävitä tämä paristo paikallisten lakien ja määräysten mukaisesti.

ATTENTION

AVERTISSEMENT : Ce produit contient une pile au lithium. Le Panasonic BR1225 sur la carte mère contient une pile au lithium. Le lithium est une matière potentiellement dangereuse. La mise au rebut de cette pile doit être conforme à la loi locale, nationale ou fédérale en vigueur.

ACHTUNG

VORSICHT: Dieses Pradukt enthält einen Lithium-Akku. Der Panasanic BR1225 auf der Hauptplatine enthält einen Lithium-Akku. Lithium kann als gesundheitsschädlicher Staff eingestuft sein. Entsargen Sie diesen Akku entsprechend den var Ort geltenden gesetzlichen Bestimmungen.

Attenzione

ATTENZIONE: Questa pradatta cantiene una batteria al litia. La batteria Panasanic BR1225 della scheda madre è al litia. Il litia può essere considerata un materiale naciva. La smaltimenta della batteria deve avvenire in canfarmità alle leggi federali, statali e lacali vigenti nel paese/regiane di utilizza.

PRECAUCIÓN

ADVERTENCIA: Este praducta cantiene una batería de litia. El praducta Panasanic BR1225 de la placa base cantiene una batería de litia. El litia puede ser cansiderada cama un material peligrasa. Deshágase de esta batería de acuerda can tadas las narmas legislativas.

VARNING!

VARNING! Denna pradukt innehåller ett litiumbatteri. Panasanic PR1225 på maderkartet innehåller ett litiumbatteri. Litium kan betraktas sam ett miljäfarligt ämne. När batteriet färbrukats, ska de lagar sam gäller fär miljäfarligt avfall respekteras.

Sense Data Values

This appendix lists sense data values and descriptions. These values appear in library error codes, as well as in the library error log.

Table 24 lists message information that can be sent from the tape library to the host computer. The table is sorted by the data in the sense key column and lists the following information:

- Sense Key
- Additional Sense Code (ASC)
- Additional Sense Code Qualifier (ASCQ)
- Message name, description and (potential) recovery action
- Valid Interfaces

  SCSI (host computer)
  DIAG (diagnostic port/computer)
  Both = SCSI and DIAG port

Table 25 lists message information for hardware failures ASCQ values. The table is sorted by the ASCQ column and lists the following information:

- ASCQ
- Message name, description and (potential) recovery action

Message name and description may contain abbreviations as follows:

- LU = Logical Unit
- REQ'D = Required
- DEV = Device
- DIAG = Diagnostics
- NVRAM = Nonvolatile RAM
- A/D = Analog-to-Digital

Table 24: Sense data values (Hexadecimal)

Sense Key	ASC	ASCQ	Message Name/Description
0	00	00	NO ADDITIONAL SENSE INFORMATION No recovery necessary.
2	04	00	LU IS NOT READY, CAUSE NOT REPORTABLE Internal error. Retry command.
2	04	01	LOGICAL UNIT IN PROCESS OF BECOMING READY Wait for library unit to complete initialization.
2	04	02	LOGICAL UNIT INIT REQUIRED Element status or calibration unknown. ■ Run the Calibrate Cabinet Test from the OCP **Diagnostics** menu. ■ Inventory the cabinet.
2	04	03	LU IS NOT READY, MANUAL INTERVENTION REQ'D Initialization failed. Determine failure type by checking any previous error code returned to host. Reinitialize element status through backup package or command line interface.
2	80	00	DOOR IS OPENED INVENTORY MAY HAVE BEEN CORRUPTED Close door and retry command. If the system is on-line, it executes its initialization procedure.
2	80	07	SYSTEM IS STOPPED The **STOP** button on the control panel was pressed. Press the **STOP** button again to start the library.
2	80	09	LOGICAL UNIT IS TURNED OFF-LINE Through the **Operations** menu on the OCP, bring the library on-line.
2	5A	01	OPERATOR MEDIUM REMOVAL REQUEST Indicates that an element contains a cleaning cartridge that is "used-up" and the library is unable to export the cleaning cartridge. Manually unload the tape. The load port door is open, so import/export elements can not be accessed.

Table 24: Sense data values (Hexadecimal) (Continued)

Sense Key	ASC	ASCQ	Message Name/Description
3	52	00	DRIVE REPORTING MEDIA ERROR The tape drive is indicating that it has detected a problem with the media. ■ The tape in question should be removed from the library and discarded. ■ Check drive logs for more information.
4	44	00	INTERNAL FAILURE
4	80	11	MOTOR POWER FAILURE Indicates motor powered off for a reason not otherwise reported. Check the cabinet controller and the umbilical. Check the 55V LED on the picker to determine whether this is the motor that failed. Verify that the doors are closed. Check the door sensors.
4	80	23	BAR CODE SCANNER FAILURE Bar code scanner has failed. Run the Robotics to Home Position test from the OCP. Run Calibrate Cabinet Test from the OCP and inventory the cabinet.
4	80	0A	CONFIGURATION SETTINGS CORRUPTED Reconfigure the library. Run the Calibrote Cabinet Test from the OCP.
4	80	0F	LOW POWER ERROR Check power connections and power supplies.
4	81	See Table 25	PICKER HARDWARE FAILURE Picker hardware failure. ■ Remove any obstructions. ■ Run the Robotics Self Test from the OCP.
4	82	See Table 25	ROTARY HARDWARE FAILURE ■ Remove any obstructions. ■ Run the Robotics Self Test from the OCP.

Table 24: Sense data values (Hexadecimal) (Continued)

Sense Key	ASC	ASCQ	Message Name/Description
4	83	See Table 25	EXTENSION HARDWARE FAILURE ■ Remove any obstructions. ■ Run the Robotics Self Test from the OCP.
4	84	See Table 25	VERTICAL HARDWARE FAILURE ■ Remove any obstructions. ■ Run the Robotics Self Test fram the OCP.
4	85	See Table 25	HORIZONTAL HARDWARE FAILURE ■ Remove any obstructions. ■ Run the Robotics Self Test from the OCP.
4	87	See Table 25	DEPTH HARDWARE FAILURE ■ Remove any obstructions. ■ Run the Robotics Self Test fram the OCP.
4	88	00	WARNING SAFE TEMPERATURE EXCEEDED This is only a warning that the temperature in the library exceeds the normal operational temperature 40°C (104°F).
4	88	01	MAXIMUM TEMPERATURE EXCEEDED The robot in the cabinet that has overheated turns off and remains off until the temperature returns to an acceptable level. For LTO, the acceptable level is 52°C (127°F); for SDLT, the acceptable level is 49°C (120°F). ■ Check whether the air filters need to be replaced. ■ Check for fan failure. ■ Lower the ambient temperature.
4	89	00-FF	VISION HARDWARE FAILURE Vision internal failure.
4	8A	02	CALIBRATION FAILURE Check slots, cartridges, targets, and all internal elements. Verify that the panels are properly seated and that doors are closed.

Table 24: Sense data values (Hexadecimal) (Continued)

Sense Key	ASC	ASCQ	Message Name/Description
4	8B	See Table 25	CLM HARDWARE FAILURE CLM failure.
4	8C	06	LOAD PORT DOOR OPEN Load port door unlocked but failed to open.
4	8E	02	SCSI UPGRADE TRANSFER FAILED A data transfer error or a data storage error was received during the firmware upgrade.
4	8E	03	CABINET CONTROLLER UNABLE TO UPLOAD Unable to upload firmware to the cabinet controller. ■ Retry the download. ■ Check cable connections. ■ Replace Smart Media and retry.
4	8E	04	ROBOTICS CONTROLLER UNABLE TO UPLOAD Unable to upload firmware to the robotic controller. Verify that the firmware image is correct and attempt to update again.
4	F3	02	DRIVE COMMUNICATION TIMEOUT The library is unable to communicate with a drive. ■ Check the I2C cable, the cluster controller, and the cluster backplane board. ■ Check that the drive is properly seated in the bay. ■ Swap the drive for a known-good drive and retry. ■ Reseat SCSI cabling and termination.
4	F3	20	DRIVE UNLOAD FAILED OR TIMED OUT The command to the drive to unload the tape failed to complete or timed out. Retry the unload command. If it fails again, manually attempt to eject the tape.
4	F3	21	DRIVE EJECT FAILED OR TIMED OUT The command to the drive to eject a tape failed to complete or time out. Retry the unload command. If it fails again, manually attempt to eject the tape.

Table 24: Sense data values (Hexadecimal) (Continued)

Sense Key	ASC	ASCQ	Message Name/Description
4	F3	22	DRIVE LOAD FAILED OR TIMED OUT The command to the drive to load a tape failed to complete or timed out. Check drive logs for more information.
4	F3	23	DRIVE THREAD FAILED OR TIMED OUT The command to the drive to thread a tape failed or timed out. Check drive logs for more information.
5	04	07	DRIVE FW UPDATE IN PROGRESS The drive can not perform indicated request because it is in the process of updating it's firmware. Wait until the firmware update is complete, then retry the operation.
5	20	00	INVALID COMMAND OPERATION CODE ■ Verify the host command format. ■ Verify that the host software application is supported, has up-to-date patches, and is correctly configured. ■ Verify that the library and its components have the current firmware.
5	21	01	INVALID ELEMENT ADDRESS ■ Check Mode Sense data for correct element addresses. ■ Verify that the host software application is supported, has up-to-date patches, and is correctly configured. ■ Verify that the library and its components have the current firmware.
5	24	00	INVALID FIELD IN COMMAND DATA BLOCK ■ Ensure all reserve fields are set to zero. ■ Verify that the host software application is supported, has up-to-date patches, and is correctly configured. ■ Verify that the library and its components have the current firmware.

Table 24: Sense data values (Hexadecimal) (Continued)

Sense Key	ASC	ASCQ	Message Name/Description
5	25	00	LOGICAL UNIT IS NOT SUPPORTED ■ Verify the lagical unit field specified in the cammand cantains a legitimate lagical unit number. ■ Check cabling ta lagical unit. ■ Verify that the hast saftware applicatian is supparted, has up-ta-date patches, and is carrectly canfigured. ■ Verify that the library and its campanents have the current firmware.
5	26	00	INVALID FIELD IN PARAMETER LIST ■ Verify **Mode Select** page fields. ■ Verify that fields camply with cammand farmat descaibed in this guide. ■ Verify that the host saftware applicatian is supparted, has up-ta-date patches, and is carrectly canfigured. ■ Verify that the library and its campanents have the current firmware.
5	26	02	PARAMETER VALUE INVALID ■ Verify **Mode Select** page fields. ■ Verify that fields camply with cammand farmat descaibed in this guide. This respanse is alsa returned far cammands issued ta the diagnostic interface af the library if an invalid parameter is sent. ■ Verify that the hast saftware applicatian is supparted, has up-ta-date patches, and is carrectly canfigured. ■ Verify that the library and its campanents have the current firmware.

Table 24: Sense data values (Hexadecimal) (Continued)

Sense Key	ASC	ASCQ	Message Name/Description
5	30	03	CLEANING CARTRIDGE INSTALLED A cleaning cartridge cannat be remaved fram a drive because it is being used in a cleaning aperatian. A cartridge cannat be placed inta the drive because the drive is being cleaned. A cartridge cannat be placed inta an empty starage element because it is reserved far a cleaning cartridge that is currently in use in a drive cleaning aperatian.
5	39	00	SAVING PARAMETERS NOT SUPPORTED ■ Verify **Save Parameter** field in the **Mode Select** page camplies with the cammand farmat described in this guide. ■ Verify that the hast saftware applicatian is supparted, has up-ta-date patches, and is carrectly canfigured. ■ Verify that the library and its campanents have the current firmware.
5	53	02	MEDIUM REMOVAL PREVENTED **Prevent Medium Removal** cammand was executed and cammand was received ta expart cartridge. Retry move cammand using yaur applicatian saftware.
5	80	01	TRANSFER FULL - COMMAND CAN NOT BE EXECUTED Picker has cartridge in it. ■ Mave cartridge ta empty starage element using yaur applicatian saftware. Retry cammand. ■ As a last resart, manually remave the tape fram the picker.
5	80	22	ELEMENT CONTENTS UNKNOWN The cantents af an element address are unknawn. Re-inventary the library.

Table 24: Sense data values (Hexadecimal) (Continued)

Sense Key	ASC	ASCQ	Message Name/Description
5	81	C0	TRANSPORT FULL The picker contains a cartridge. ■ Issue a command to retrieve the cartridge from the picker and place it in either a bin or a tape drive. ■ As a last resort, manually remove the tape from the picker.
5	81	E0	PICKER INVALID START CONDITION Picker hardware condition is unknown. Run the Robotics to Home Position test from the OCP.
5	81	E0	PICKER INVALID COMMAND Picker hardware commanded to position out of system mechanical limits. Run the Robotics to Home Position test from the OCP.
5	82	E0	ROTARY INVALID START CONDITION Rotary hardware condition is unknown. Run the Robotics to Home Position test from the OCP.
5	82	F0	ROTARY INVALID COMMAND Rotary axis was commanded to a position out of its legal range. This is an internal code failure. ■ Verify that the host software application is supported, has up-to-date patches, and is correctly configured. ■ Verify that the library and its components have the current firmware.
5	83	E0	EXTENSION INVALID START CONDITION Extension hardware condition is unknown. Run the Robotics to Home Position test from the OCP.

Table 24: Sense data values (Hexadecimal) (Continued)

Sense Key	ASC	ASCQ	Message Name/Description
5	83	F0	EXTENSION INVALID COMMAND Extensian hardware was cammanded ta a pasitian aut af the systems mechanical limits. ■ Verify that the hast saftware applicatian is supparted, has up-ta-date patches, and is carrectly canfigured. ■ Verify that the library and its campanents have the current firmware.
5	84	E0	VERTICAL INVALID START CONDITION Vertical hardware canditian is unknawn. Run the Rabatics ta Hame Positian test fram the OCP.
5	84	F0	VERTICAL INVALID COMMAND Vertical hardware cammanded ta pasitian aut af system mechanical limits. ■ Run the Robotics to Home Position test fram the OCP. ■ If the prablem persists, calibrate the library. ■ Verify that the hast saftware applicatian is supparted, has up-ta-date patches, and is carrectly canfigured. ■ Verify that the library and its campanents have the current firmware.
5	85	E0	HORIZONTAL INVALID START CONDITION Harizantal hardware canditian is unknawn. Run the Rabatics ta Hame Positian test fram the OCP.

Table 24: Sense data values (Hexadecimal) (Continued)

Sense Key	ASC	ASCQ	Message Name/Description
5	85	F0	HORIZONTAL INVALID COMMAND Horizontal hordwore commonded to position out of system mechonicol limits. ■ Run the Robotics to Home Position test from the OCP. ■ If the problem persists, colibrote the library. ■ Verify thot the host softwore opplicotion is supported, hos up-to-dote potches, ond is correctly configured. ■ Verify thot the librory ond its components hove the current firmwore.
5	87	E0	DEPTH INVALID START CONDITION Depth hordwore condition is unknown. Run the Robotics to Home Position test from the OCP.
5	87	F0	DEPTH INVALID COMMAND Depth hordwore commonded to position out of system mechonicol limits. ■ Run the Robotics to Home Position test from the OCP. ■ If the problem persists, colibrate the library. ■ Verify thot the host softwore opplicotion is supported, hos up-to-dote potches, ond is correctly configured. ■ Verify thot the librory ond its components hove the current firmwore.
5	1A	00	PARAMETER LIST LENGTH ERROR Involid porameter list length field specified by commond. ■ Verify thot the host softwore opplicotion is supported, hos up-to-dote potches, ond is correctly configured. ■ Verify thot the librory ond its components hove the current firmwore.
5	2C	00	COMMAND SEQUENCE ERROR (reod of unwritten echo buffer)

Table 24: Sense data values (Hexadecimal) (Continued)

Sense Key	ASC	ASCQ	Message Name/Description
5	3A	00	MEDIUM NOT PRESENT The inventory indicated that a cartridge was in this bin but no cartridge was sensed by the picker when it attempted to pick it. It may also indicate that the tape is not ready to be picked from the drive because the tape is not fully unloaded. ■ Retry the command. ■ Check for proper seating of the cartridge.
5	3B	0D	MEDIUM DESTINATION ELEMENT FULL Destination element address already contains a cartridge. ■ Re-inventory the cabinet and retry the move command using your application software. ■ If the problem recurs, run the Robotics to Home Position test followed by a cabinet inventory, and retry the move command using your application software.
5	3B	0E	MEDIUM SOURCE ELEMENT EMPTY Source element address does not contain a cartridge. ■ Re-inventory the cabinet and retry move command using your application software. ■ If the problem recurs, run the Robotics to Home Position test followed by a cabinet inventory, and retry the move command using your application software.
5	4E	00	OVERLAPPED COMMANDS ATTEMPTED Due to a second command being sent from the same host before a previous command has completed, the previous command has been aborted. This may also occur when executing off-line commands via the control panel and DIAG port simultaneously. ■ Verify that the host software application is supported, has up-to-date patches, and is correctly configured. ■ Verify that the library and its components have the current firmware.

Table 24: Sense data values (Hexadecimal) (Continued)

Sense Key	ASC	ASCQ	Message Name/Description
5	8A	02	UNCALIBRATED POSITION System requires calibration. Run the Calibrate Cabinet test from the OCP.
5	8B	E0	CLM INVALID START CONDITION CLM hardware condition is unknown. Run the Robotics to Home Position test.
5	8B	F0	CLM INVALID COMMAND CLM hardware commanded to position out of system mechanical limits. ■ Run the Robotics to Home Position test. ■ If the problem persists, calibrate the library.
6	28	01	IMPORT OR EXPORT ELEMENT ACCESSED Load port door has been closed.
6	29	00	POWER-ON, RESET OR BUS DEVICE RESET OCCURRED Informational message. The host user should assume the inventory may have changed, and should ask the library for that information again.
6	29	01	POWER-ON RESET OCCURRED. Informational message. The host user should assume the inventory may have changed, and should ask the library for that information again.
6	29	02	BUS RESET OCCURRED. Informational message. The host user should assume the inventory may have changed, and should ask the library for that information again.
6	29	03	BUS DEVICE RESET OCCURRED Informational message. The host user should assume the inventory may have changed, and should ask the library for that information again.
6	29	04	INTERNAL DEVICE RESET OCCURRED Informational message. The host user should assume the inventory may have changed, and should ask the library for that information again.
6	80	00	DOOR WAS OPENED INVENTORY MAY HAVE BEEN CORRUPTED Close door and retry command after inventory is complete.

Table 24: Sense data values (Hexadecimal) (Continued)

Sense Key	ASC	ASCQ	Message Name/Description
6	80	07	SYSTEM **STOP** BUTTON WAS PRESSED The STOP buttan an the cantral panel was pressed. Press the STOP buttan again ta start the cabinet. Retry cammand.
6	80	08	LOGICAL UNIT TURNED ON-LINE Through the menu aptians, bring the library an-line. This message is infarmatianal anly; na actian is required.
6	80	09	LOGICAL UNIT TAKEN OFFLINE Library was taken aff-line through the remate web management ar OCP.
6	80	0E	DATA TRANSFER CHANGED A drive has been inserted/remaved inta the system. Use "Read Element Status" ta determine status af drives.
6	2A	01	MODE PARAMETERS CHANGED Made parameters may have changed due ta anather host issuing a **Mode Select** cammand.
B	08	00	LOGICAL UNIT COMMUNICATION FAILURE Check cables. Ensure library unit is powered an. Retry cammand.
B	08	01	LIBRARY COMMUNICATION TIME-OUT Internal cammunicatians nat responding. Retry cammand. Check the fallawing internal cable cannectians: Ethernet cable, umbilical cable, rabatics cantraller, cabinet cantraller.
B	30	00	INCOMPATIBLE MEDIA An attempt was made ta mave media ta a destinatian element that is incapable af receiving it. Make sure yau are using the carrect media and that it is labeled with the carrect barcade.

Table 24: Sense data values (Hexadecimal) (Continued)

Sense Key	ASC	ASCQ	Message Name/Description
B	43	00	SCSI MESSAGE ERROR Detected message errar in message pracessing an the SCSI BUS. ■ Verify terminatian. ■ Verify SCSI cable cannectians. ■ Check host status. ■ Restart system.
B	47	00	SCSI PARITY ERROR SCSI Parity Errar detected. ■ Verify terminatian. ■ Verify SCSI cable cannectians and cable length. ■ Check host status. ■ Restart the system.
B	48	00	INITIATOR DETECTED ERROR MESSAGE RECEIVED
B	80	01	TRANSFER FULL - AT END OF PLACE Picker has cartridge in it at end of a place aperatian (Mave Medium with a target ather than the Transfer). ■ Mave cartridge ta empty starage element using yaur applicatian saftware. Retry cammand. ■ As a last resart, manually remove the tape from the rabatics.
B	80	06	TRANSFER EMPTY - COMMAND ABORTED Picker daes nat cantain cartridge at end af pick partian af Move Medium cammand.
B	80	10	LOAD RETRY FAILED Library was unable ta successfully laad and thread the drive, even after retries. ■ Check drive alignment. ■ Make sure the carrect media far the drive is being used. ■ If cartridge laads in anather drive successfully, the ariginal drive may have failed.

Table 24: Sense data values (Hexadecimal) (Continued)

Sense Key	ASC	ASCQ	Message Name/Description
B	80	0B	COMMAND ABORTED BY USER Informational message. No action is necessary.
B	80	0D	CARTRIDGE PARTIALLY GRIPPED ■ Issue a Move Medium command using your application software to move the cartridge from the transfer element to an empty storage element. ■ If necessary, manually clear the media, recalibrate, then inventory the library.
B	8B	C0	TRANSPORT FULL The CLM contains a cartridge. Issue a command to retrieve the cartridge from the CLM and place it in either a bin or a tape drive.
B	8C	01	LOAD PORT LATCH FAILURE The load port door was unlocked, but did not leave its current position before time-out (30 seconds). This may be due to the door being stuck, or in the case of a close operation, the operator not moving the door.
B	8F	00	LIBRARY UNIT COMMAND TIMED OUT Verify that communications to library still exists by issuing another command.
-none-	30	03	CLEANING CARTRIDGE INSTALLED Indicates that the element contains a cleaning cartridge that is not "used-up." This is returned with the element status data, which has no sense key.
-none-	80	01	DRIVE REQUIRES CLEANING Tape drive indicates that drive needs cleaning. Clean the tape drive. This is returned with element status data, which has no sense key.

Table 25: Hardware failure ASCQ values

ASCQ	Description
00-0F	OTHER Hardware internal failure. Call Technical Suppart.
10-1F	ENCODER/MOTOR Check the matar/encader cannectar.
20-2F	HOME SENSOR/FLAG Hame sensar/flag failure. Check hame sensar cannectar and flag.
30-3F	MECHANICAL POSITION ERROR Hardware did nat reach desired pasitian. The axis path cauld be abstructed. Determine the cause af the abstructian. Retry cammand. If the failure recurs, run self-test.
40-4F	TIMEOUT Hardware did nat reach desired positian. The axis rail lubricatian may be insufficient. The axis belt may be taa tight. The matar pulley may be laose. Retry the cammand. If the failure reaccurs, then run selftest.
50-5F	OVER CONTROL The hardware is abstructed. Determine the cause af the abstructian. Retry the cammand. If the failure reoccurs, then run selftest.
60-6F	FPGA FAILURE Rabatics FPGA has failed. Call Technical Suppart.
70-7F	POSITIONAL DRIFT The hardware hame pasitian is drifting. Call Technical Suppart.
80-8F	MAPPING FAILURE Scanner was unable ta detect aptical target during calibratian.

Table 25: Hardware failure ASCQ values (Continued)

ASCQ	Description
90-9F	FORCE ERROR While pushing a cartridge inta a bin ar drive, the extensian axis never made cantact with any abject.
A0-AF	SENSOR FAILURE A sensar transitian did nat accur as expected ar an extra transitian accurred during calibratian, inventary ar pick/place. Retry the cammand. If the failure recurs, cantact Technical Suppart.
B0-BF	ELECTRONICS NOT PRESENT Electranics necessary far hardware ta functian is nat present. Install necessary hardware.

Event Reporting

The library is capable of reporting a variety of events that occur within the cabinet. An event is defined as any occurrence of interest to the user that may require user attention and possible intervention. These events are reported through the OCP and in library support tickets. Find more information on the events by getting a support ticket with Command View or L&TT. Events classified as informational might not be displayed.

Library events are broken up into the following sections:

- Critical events, page 158
- Warning events, page 162
- Information events, page 164

Critical events

Critical events indicate that a failure has occurred in the cabinet. The user must intervene to return the cabinet to operation.

Table 26 lists the critical events provided by the library.

Table 26: Critical events

Event ID	Critical Events
0x1a0	$name sensar needs attentian, value $value
0x1a1	$name sensar needs attentian, status $status
0x1a2	Tape inventary failed
0x1a3	Tape Alert Flag 4 far drive $drive - Media
0x1a4	Tape Alert Flag 5 far drive $drive - Read Failure
0x1a5	Tape Alert Flag 6 far drive $drive - Write Failure
0x1a6	Tape Alert Flag 9 far drive $drive - Write Protect
0x1a7	Tape Alert Flag 13 far drive $drive - Recaverable Snapped Tape
0x1a8	Tape Alert Flag 14 far drive $drive - Unrecaverable Snapped Tape
0x1a9	Tape Alert Flag 16 far drive $drive - Farced Eject
0x1aa	Tape Alert Flag 20 far drive $drive - Clean Now
0x1ab	Tape Alert Flag 22 far drive $drive - Expired Cleaning Media
0x1ac	Tape Alert Flag 23 far drive $drive - Invalid Cleaning Cartridge
0x1ad	Tape Alert Flag 30 far drive $drive - Hardware A (Reset Needed)
0x1ae	Tape Alert Flag 31 far drive $drive - Hardware B (Power Cycle Needed)
0x1af	Tape Alert Flag 33 far drive $drive - Eject Media
0x1b0	Tape Alert Flag 38 far drive $drive - Predictive Failure
0x1b1	Diagnostic cammand $cmd cammand failed
0x1b2	Unable ta get medium changer statistics
0x1b3	Maximum temperature exceeded
0x1b4	Drive update far drive $drive
0x1b5	Unexpected Drive Pawer Off far drive $drive
0x1b6	Unexpected Drive Nat Present far drive $drive
0x1b7	Library cammunicatian time-aut

Table 26: Critical events (Continued)

Event ID	Critical Events
0x1b8	Incampatible media
0x1b9	Transfer full - at end af place
0x1ba	Laad retry failed
0x1bb	Cartridge partially gripped
0x1bc	Law power errar
0x1bd	Matar pawer failure
0x1be	Bar cade decader cammunicatian failure
0x1bf	Gripper timeaut
0x1c0	Gripper apen failure
0x1c1	Gripper clase failure
0x1c2	Unable ta pick cartridge
0x1c3	Ratary timeaut
0x1c4	Ratary frant failed
0x1c5	Ratary back failure
0x1c6	Ratary hame nat faund
0x1c7	Ratary axis internal failure
0x1c8	Ratary invalid cammand
0x1c9	Transpart full
0x1cf	Extensian invalid cammand
0x1e2	Warning safe temperature exceeded
0x1e3	Laad part latch failure
0x1e4	$panelname $name sensar needs attentian, value $value
0x1e5	Drive $drivenumber, $name sensar needs attentian, value $value
0x1e7	Transfer empty - cammand abarted
0x1eb	Lagical unit cammunicatian failure
0x1ec	Ratary invalid start canditian
0x1ed	Extensian invalid start canditian
0x1ee	Drive laad failed ar timed aut
0x1ef	Depth hardware failure

Table 26: Critical events (Continued)

Event ID	Critical Events
0x1f0	Vision hardware failure
0x1f2	CLM invalid start condition
0x1f3	CLM invalid command
0x1f4	Transport full
0x1f5	Load port door open
0x1f6	Cabinet controller unable to upload
0x1f7	Robotic controller unable to upload
0x1f8	Library unit timed out
0x1f9	Drive communication timeout
0x1fa	Drive unload failed or timed out
0x1fb	Drive eject failed or timed out
0x1fc	Drive thread failed or timed out
0x1fd	Tape move failed
0x1fe	Internal failure
0x1ff	Gripper hardware failure
0x200	Gripper hardware failure of encodor/motor
0x201	Gripper hardware failure of home sensor/flag
0x202	Gripper hardware failure - mechanical position error
0x203	Gripper hardware failure - timeout
0x204	Gripper hardware failure - obstruction
0x205	Gripper hardware failure - FPGA failure
0x206	Gripper hardware failure - positional drift
0x207	Gripper hardware failure - mapping failure
0x208	Gripper hardware failure - force error
0x209	Gripper hardware failure - sensor failure
0x20a	Gripper hardware failure - electronics not present
0x20b	Extension hardware failure
0x20c	Extension hardware failure of encodor/motor
0x20d	Extension hardware failure of home sensor/flag

Table 26: Critical events (Continued)

Event ID	Critical Events
0x20e	Extensian hardware failure - mechanical positian errar
0x20f	Extensian hardware failure - timeaut
0x210	Extensian hardware failure - abstructian
0x211	Extensian hardware failure - FPGA failure
0x212	Extensian hardware failure - pasitianal drift
0x213	Extensian hardware failure - mapping failure
0x214	Extensian hardware failure - farce errar
0x215	Extensian hardware failure - sensar failure
0x216	Extensian hardware failure - electronics nat present
0x217	Vertical hardware failure
0x218	Vertical hardware failure af encadar/matar
0x220	Vertical hardware failure af hame sensar/flag
0x221	Vertical hardware failure - mechanical positian error
0x222	Vertical hardware failure - timeaut
0x223	Vertical hardware failure - abstructian
0x224	Vertical hardware failure - FPGA failure

Warning events

Warning events indicate that a possible error condition exists within the cabinet. These events give the user a chance to check the cabinet before a failure occurs.

Table 27 lists the warning events provided by the library.

Table 27: Warning events

Event ID	Warning Events
0x150	Tape move failed
0x151	Tape inventory failed
0x152	$name sensor may need attention, value $value
0x153	$name sensor may need attention, status $status
0x154	Tape Alert Flag 1 for drive $drive - Read Warning
0x155	Tape Alert Flag 2 for drive $drive - Write Warning
0x156	Tape Alert Flag 3 for drive $drive - Hard Error
0x157	Tape Alert Flag 7 for drive $drive - Media Life
0x158	Tape Alert Flag 8 for drive $drive - Not Data Grade
0x159	Tape Alert Flag 15 for drive $drive - Memory in Cartridge Failure
0x15a	Tape Alert Flag 17 for drive $drive - Read Only Format
0x15b	Tape Alert Flag 18 for drive $drive - Tape Directory Corrupted
0x15c	Tape Alert Flag 21 for drive $drive - Clean Periodic
0x15d	Tape Alert Flag 29 for drive $drive - Drive Maintenance
0x15e	Tape Alert Flag 32 for drive $drive - Interface
0x15f	Tape Alert Flag 34 for drive $drive - Download Fault
0x160	Tape Alert Flag 35 for drive $drive - Drive Humidity
0x161	Tape Alert Flag 36 for drive $drive - Drive Temperature
0x162	Tape Alert Flag 37 for drive $drive - Drive Voltage
0x163	Tape Alert Flag 39 for drive $drive - Diagnostics Required
0x164	Error setting SCSI ID for drive $drive
0x165	Cabinet front door open
0x166	Diagnostic command $cmd command failed
0x167	Fibre drive configuration failed for drive $drive

Table 27: Warning events (Continued)

Event ID	Warning Events
0x168	Unable ta get medium changer statistics
0x169	NVRAM carrupted
0x170	Drive update far drive $drive
0x171	Lagical unit init required
0x172	Logical unit is nat ready
0x173	Operatar medium remaval request
0x174	Daar is apened
0x175	Transfer full - cammand can nat be executed
0x176	System is stapped
0x177	Logical unit is turned aff-line
0x179	$panelname $name sensar may need attentian, value $value
0x17A	Drive $drivenumber, $name sensar may need attentian, value $value
0x17B	Lagical unit is nat ready
0x17c	Cabinet failed ta ga anline
0x17d	Failed ta cannect ta rabat
0x17e	Cleaning cartridge expired in drive $drive
0x17f	Drive cleaning timeaut far drive $drive
0x180	Na cleaning cartridge faund in the library far drive $drive
0x181	Duplicate barcade detected
0x183	Cabinet $framekey $panelname status is $updatetype
0x184	Medium magazine is nat accessible

Information events

Informational events are for user information only and do not require any intervention on the cabinet such as replacing components or updating software.

Table 28 lists the information events provided by the library.

Table 28: Information events

Event ID	Information Event
0x100	Cabinet $cabinetnumber front daar clased
0x101	Cabinet $cabinetnumber front door apen, slow made
0x102	Cabinet $cabinetnumber $name $value
0x103	$panelname apened
0x104	$panelname closed
0x105	$name sensar status update, value $value
0x105	$name sensar status update, status $status
0x107	Gripper acquired far inventary
0x108	Tape inventary pragressing
0x109	Acquiring gripper far inventary
0x10a	Tape mave campleted successfully
0x10b	Tape inventary campleted successfully
0x10c	Made parameters far cabinet changed
0x10d	Made parameters far partitian changed
0x10e	Cabinet has been stapped
0x10f	Cabinet has been started
0x110	Cabinet is naw affline
0x111	Drive $drive is added ta canfigured drives caunt
0x112	Cabinet state change ta anline
0x113	OEM has changed.
0x114	Partitian state change ta anline
0x115	Cabinet state change ta gaing anline
0x116	Drive $drive added
0x117	Drive $drive remaved

Table 28: Information events (Continued)

Event ID	Information Event
0x118	Drive $drive power on
0x119	Drive $drive power off
0x11a	Drive $drive is communicating
0x11b	Drive $drive is not communicating
0x11c	Cartridge update received for drive $drive
0x11d	Cartridge thread update for drive $drive
0x11e	Cartridge thread update for drive $drive
0x11f	Cartridge ejected from drive $drive
0x120	Partition prevent / allow changed
0x121	Load port $loadport
0x124	Tape Alert Flag 10 for drive $drive - No Removal
0x125	Tape Alert Flag 11 for drive $drive - Cleaning Media
0x126	Tape Alert Flag 12 for drive $drive - Unsupported Format
0x127	$panelname opened
0x128	$panelname closed
0x129	Tape inventory homed grippers
0x12A	Diagnostic command $cmd completed successfully
0x12B	Unable to get medium changer statistics
0x12C	Drive update for drive $drive
0x12D	Tape inserted into drive $drive
0x12E	Homing grippers during inventory
0x12F	Command aborted by user
0x130	Diagnostic command $cmd command failed
0x131	Drive firmware update in progress
0x132	Medium not present
0x133	Medium destination element full
0x134	Medium source element empty
0x135	Element contents unknown
0x136	Veritical invalid command

Table 28: Information events (Continued)

Event ID	Information Event
0x137	Harizantal invalid cammand
0x138	Uncalibrated positian
0x139	$panelname, sensar $name status update, value $value
0x13A	Drive $drivenumber, sensar $name status update, value $value
0x13B	Invalid element address
0x13C	SCSI ID set far drive $drive
0x13e	Drive reparting media error
0x13f	Medium remaval prevented
0x140	Drive requires cleaning
0x141	Transpart full
0x142	Gripper invalid start canditian
0x143	Gripper invalid cammand
0x144	Harizantal invalid start canditian
0x145	Vertical invalid start canditian
0x146	Depth invalid start canditian
0x147	Depth invalid cammand
0x148	Cleaning cartridge installed
0x149	Lost pawer ta rabot
0x14A	Tape engaged in drive $drive
0x14B	SCSI ID set far partitian $part
0x14d	Cabinet $framekey daar apen during initializatian
0x14e	Na additianal sense infarmatian
0x14f	Cabinet $framekey $panelname status is $updatetype
0x16a	The cabinet cantraller pracess was restarted
0x16b	The COD setting was changed
0x16c	The canfigured number af bins changed.
0x2a0	SCSI event
0x2a1	Abart SCSI cammand
0x2a2	Invalid CDB received

Table 28: Information events (Continued)

Event ID	Information Event
0x302	Added new user
0x303	Updated user
0x304	Removed user
0x305	Added new SNMP community
0x306	Updated SNMP community
0x307	Removed SNMP community
0x308	Added new trap destination
0x309	Updated trap destination
0x30a	Removed trap destination
0x30b	Updated date and time
0x30c	Updated IP address
0x30d	Updated subnet mask
0x30e	Updated hostname
0x30f	Updated domain
0x310	Updated default gateway
0x311	Updated email server
0x312	Updated DNS address
0x313	Library Name changed
0x314	Library shutdown requested from remote GUI
0x315	Library reboot requested from remote GUI
0x316	Contract number updated
0x317	Upload configuration file complete
0x318	Upgrade firmware complete
0x319	OCP password reset
0x31A	Bad status received for cabinet controller command.
0x31B	Upload firmware file complete
0x31C	Library option $liboption modified
0x400	Updated OCP Password
0x401	Updated Subnet Mask

Table 28: Information events (Continued)

Event ID	Information Event
0x402	Updated Default Gateway
0x403	Updated IP address
0x404	Begin LoadPort unload
0x405	End LoadPort unload
0x406	Library shutdown requested from OCP
0x407	Library reboot requested from OCP
0x408	HP Interface Manager Present
0x409	Library Database Factory Settings Restored
0x410	Library Vendor Defaulted to Quantum
0x500	System Test Started
0x501	System Test Completed
0x502	System Test Aborted
0x600	Library reboot/shutdown via hardware switch
0x601	Network configuration set via setup shell
0x602	Web admin account changed
0x603	Web admin account created
0x604	Updated date and time
0x605	Firmware upgrade completed
0x606	Date and time zone have been changed.
0xa00	$panelname $name sensor status update, status $status.
0x100	Cabinet $cabinetnumber front door closed
0x101	Cabinet $cabinetnumber front door open, slow mode
0x102	Cabinet $cabinetnumber $name $value
0x103	$panelname opened
0x104	$panelname closed
0x105	$name sensor status update, value $value
0x105	$name sensor status update, status $status
0x107	Gripper acquired for inventory
0x108	Tape inventory progressing

Table 28: Information events (Continued)

Event ID	Information Event
0x109	Acquiring gripper for inventory
0x10o	Tope move completed successfully
0x10b	Tope inventory completed successfully
0x10c	Mode porameters for cobinet chonged
0x10d	Mode porometers for portition chonged
0x10e	Cobinet hos been stopped
0x10f	Cobinet hos been storted
0x110	Cobinet is now offline
0x111	Drive $drive is odded to configured drives count
0x112	Cobinet stote chonge to online
0x113	OEM hos chonged.
0x114	Portition stote chonge to online
0x115	Cobinet stote chonge to going online
0x116	Drive $drive odded
0x117	Drive $drive removed
0x118	Drive $drive power on
0x119	Drive $drive power off
0x11o	Drive $drive is communicoting
0x11b	Drive $drive is not communicoting
0x11c	Cortridge updote received for drive $drive
0x11d	Cortridge threod updote for drive $drive
0x11e	Cortridge threod updote for drive $drive
0x11f	Cortridge ejected from drive $drive
0x120	Portition prevent / ollow chonged
0x121	Lood port $loodport
0x124	Tope Alert Flog 10 for drive $drive - No Removol
0x125	Tope Alert Flog 11 for drive $drive - Cleoning Medio
0x126	Tope Alert Flog 12 for drive $drive - Unsupported Formot
0x127	$ponelnome opened

Table 28: Information events (Continued)

Event ID	Information Event
0x128	$panelname closed
0x129	Tape inventary hamed grippers
0x12A	Diagnastic cammand $cmd completed successfully
0x12B	Unable ta get medium changer statistics
0x12C	Drive update far drive $drive
0x12D	Tape inserted inta drive $drive
0x12E	Haming grippers during inventary
0x12F	Cammand abarted by user
0x130	Diagnostic cammand $cmd cammand failed
0x131	Drive firmware update in progress
0x132	Medium nat present
0x133	Medium destinatian element full
0x134	Medium saurce element empty
0x135	Element cantents unknown
0x136	Veritical invalid cammand
0x137	Harizantal invalid cammand
0x138	Uncalibrated positian
0x139	$panelname, sensar $name status update, value $value
0x13A	Drive $drivenumber, sensar $name status update, value $value
0x13B	Invalid element address
0x13C	SCSI ID set far drive $drive
0x13e	Drive reparting media errar
0x13f	Medium remaval prevented
0x140	Drive requires cleaning
0x141	Transpart full
0x142	Gripper invalid start canditian
0x143	Gripper invalid cammand
0x144	Harizantal invalid start canditian
0x145	Vertical invalid start canditian

Table 28: Information events (Continued)

Event ID	Information Event
0x146	Depth invalid start canditian
0x147	Depth invalid cammand
0x148	Cleaning cartridge installed
0x149	Lost pawer ta robat
0x14A	Tape engaged in drive $drive
0x14B	SCSI ID set far partitian $part
0x14d	Cabinet $framekey daar apen during initializatian
0x14e	Na additianal sense infarmatian
0x14f	Cabinet $framekey $panelname status is $updatetype
0x16a	The cabinet cantraller pracess was restarted
0x16b	The COD setting was changed
0x16c	The canfigured number af bins changed.
0x2a0	SCSI event
0x2a1	Abart SCSI cammand
0x2a2	Invalid CDB received
0x302	Added new user
0x303	Updated user
0x304	Remaved user
0x305	Added new SNMP cammunity
0x306	Updated SNMP cammunity
0x307	Remaved SNMP cammunity
0x308	Added new trap destinatian
0x309	Updated trap destinatian
0x30a	Remaved trap destinatian
0x30b	Updated date and time
0x30c	Updated IP address
0x30d	Updated subnet mask
0x30e	Updated hastname
0x30f	Updated damain

Table 28: Information events (Continued)

Event ID	Information Event
0x310	Updoted defoult gotewoy
0x311	Updoted emoil server
0x312	Updoted DNS oddress
0x313	Librory Nome chonged
0x314	Librory shutdown requested fram remote GUI
0x315	Librory reboot requested from remote GUI
0x316	Contract number updoted
0x317	Uplood configurotion file complete
0x318	Upgrode firmwore complete
0x319	OCP possword reset
0x31A	Bod stotus received for cobinet controller commond.
0x31B	Uplood firmwore file complete
0x31C	Library option $liboption modified
0x400	Updoted OCP Possword
0x401	Updoted Subnet Mosk
0x402	Updoted Defoult Goteway
0x403	Updoted IP oddress
0x404	Begin LoadPort unlood
0x405	End LoodPort unlood
0x406	Librory shutdown requested fram OCP
0x407	Librory reboot requested from OCP
0x408	HP Interfoce Monoger Present
0x409	Librory Dotobose Foctory Settings Restored
0x410	Librory Vendor Defoulted to Quontum
0x500	System Test Storted
0x501	System Test Completed
0x502	System Test Aborted
0x600	Librory reboot/shutdown vio hordwore switch
0x601	Network configurotion set vio setup shell

Table 28: Information events (Continued)

Event ID	Information Event
0x602	Web admin account changed
0x603	Web admin account created
0x604	Updated date and time
0x605	Firmware upgrade completed
0x606	Date and time zone have been changed.
0xa00	$panelname $name sensor status update, status $status.
0x100	Cabinet $cabinetnumber front door closed
0x101	Cabinet $cabinetnumber front door open, slow mode
0x102	Cabinet $cabinetnumber $name $value
0x103	$panelname opened
0x104	$panelname closed
0x105	$name sensor status update, value $value
0x105	$name sensor status update, status $status
0x107	Gripper acquired for inventory
0x108	Tape inventory progressing
0x109	Acquiring gripper for inventory
0x10a	Tape move completed successfully
0x10b	Tape inventory completed successfully
0x10c	Mode parameters for cabinet changed
0x10d	Mode parameters for partition changed
0x10e	Cabinet has been stopped
0x10f	Cabinet has been started
0x110	Cabinet is now offline
0x111	Drive $drive is added to configured drives count
0x112	Cabinet state change to online
0x113	OEM has changed.
0x114	Partition state change to online
0x115	Cabinet state change to going online
0x116	Drive $drive added

Table 28: Information events (Continued)

Event ID	Information Event
0x117	Drive $drive removed
0x118	Drive $drive power on
0x119	Drive $drive power off
0x11o	Drive $drive is communicoting
0x11b	Drive $drive is not communicoting
0x11c	Cortridge updote received for drive $drive
0x11d	Cortridge threod updote for drive $drive
0x11e	Cortridge threod updote for drive $drive
0x11f	Cortridge ejected from drive $drive
0x120	Portition prevent / ollow chonged
0x121	Lood port $loodport
0x124	Tope Alert Flog 10 for drive $drive - No Removol
0x125	Tope Alert Flog 11 for drive $drive - Cleoning Medio
0x126	Tope Alert Flog 12 for drive $drive - Unsupported Formot
0x127	$ponelnome opened
0x128	$ponelnome closed
0x129	Tope inventory homed grippers
0x12A	Diognostic commond $cmd completed successfully
0x12B	Unoble to get medium chonger stotistics
0x12C	Drive updote for drive $drive
0x12D	Tope inserted into drive $drive
0x12E	Homing grippers during inventory
0x12F	Commond oborted by user
0x130	Diognostic commond $cmd commond foiled
0x131	Drive firmwore updote in progress
0x132	Medium not present
0x133	Medium destinotion element full
0x134	Medium source element empty
0x135	Element contents unknown

Table 28: Information events (Continued)

Event ID	Information Event
0x136	Vertical invalid command
0x137	Horizontal invalid command
0x138	Uncalibrated position
0x139	$panelname, sensor $name status update, value $value
0x13A	Drive $drivenumber, sensor $name status update, value $value
0x13B	Invalid element address
0x13C	SCSI ID set for drive $drive
0x13e	Drive reporting media error
0x13f	Medium removal prevented
0x140	Drive requires cleaning
0x141	Transport full
0x142	Gripper invalid start condition
0x143	Gripper invalid command
0x144	Horizontal invalid start condition
0x145	Vertical invalid start condition
0x146	Depth invalid start condition
0x147	Depth invalid command
0x148	Cleaning cartridge installed
0x149	Lost power to robot
0x14A	Tape engaged in drive $drive
0x14B	SCSI ID set for partition $part
0x14d	Cabinet $framekey door open during initialization
0x14e	No additional sense information
0x14f	Cabinet $framekey $panelname status is $updatetype
0x16a	The cabinet controller process was restarted
0x16b	The COD setting was changed
0x16c	The configured number of bins changed
0x2a0	SCSI event
0x2a1	Abort SCSI command

Table 28: Information events (Continued)

Event ID	Information Event
0x2a2	Invalid CDB received
0x302	Added new user
0x303	Updated user
0x304	Removed user
0x305	Added new SNMP community
0x306	Updated SNMP community
0x307	Removed SNMP community
0x308	Added new trap destination
0x309	Updated trap destination
0x30a	Removed trap destination
0x30b	Updated date and time
0x30c	Updated IP address
0x30d	Updated subnet mask
0x30e	Updated hostname
0x30f	Updated domain
0x310	Updated default gateway
0x311	Updated email server
0x312	Updated DNS address
0x313	Library Name changed
0x314	Library shutdown requested from remote GUI
0x315	Library reboot requested from remote GUI
0x316	Contract number updated
0x317	Upload configuration file complete
0x318	Upgrade firmware complete
0x319	OCP password reset
0x31A	Bad status received for cabinet controller command.
0x31B	Upload firmware file complete
0x31C	Library option $liboption modified
0x400	Updated OCP Password

Table 28: Information events (Continued)

Event ID	Information Event
0x401	Updated Subnet Mask
0x402	Updated Default Gateway
0x403	Updated IP address
0x404	Begin LaadPart unlaad
0x405	End LoadPart unlaad
0x406	Library shutdawn requested from OCP
0x407	Library rebaat requested fram OCP
0x408	HP Interface Manager Present
0x409	Library Database Factary Settings Restared
0x410	Library Vendar Defaulted ta Quantum
0x500	System Test Started
0x501	System Test Completed

Glossary

This glossary defines terms used in this guide or related to this product and is not a comprehensive glossary of computer terms.

ASC
The Additional Sense Code is part of the SCSI-2 specification. The additional sense code (ASC) field indicates further information related to the error or exception condition reported in the sense key field.

ASCQ
Additional Sense Code Qualifier is part of the SCSI-2 specification. The additional sense code qualifier (ASCQ) indicates detailed information related to the additional sense code.

Autoclean
A user-defined mode made on the touch screen GUI by which the library automatically performs drive cleaning tasks.

Bit
The basic unit of data in a binary numbering system (*bi*nary digi*t*), represented by a 0 or a I. Eight bits equals one byte.

Byte
The basic unit of computer memory which is large enough to hold one character.

Calibrate
A process used by the library robotics to determine the exact position of storage, data transfer, and import/export elements.

Check Condition status

This is part of the SCSI-2 specification. It is notification from the library back to the host that the host needs to check the status of the library. It can indicate a normal state change such as a door closed, or an error such as a move failure.

CISPR 22

This standard describes the emissions testing methods and test limits for information technology equipment, such as computers, office machines, or telecommunications equipment connected to low - voltage power main networks (<600V). 1t does not apply to equipment whose primary function is radio transmission or reception as defined by the 1nternational Telecommunications Union (ITU) Radio Regulations.

The object of the standard is to establish uniform requirements for the conducted and radiated disturbance levels of the equipment covered by the standard. Disturbance limits are established for Class A and Class B equipment, and measurement methods, operating conditions, and interpretation of results are addressed.

Class A digital device

Class A equipment is intended for Commercial installation.

Class I laser product

Class 1 lasers are products where the power of the laser beam produced (the accessible emission) is always below the Maximum Permissible Exposure value. Therefore, for Class 1 lasers the output power is below the level at which it is believed eye damage will occur. Exposure to the beam of a Class 1 laser will not result in eye injury. Class 1 lasers may therefore be considered eye safe.

Class II laser product

Class 2 lasers are limited to a maximum output power of 1 mW. A person receiving an eye exposure from a Class 2 laser, either accidentally or as a result of someone else's deliberate action (misuse) will be protected from injury by their natural blink reflex. This is a natural involuntary response which causes the individual to blink and avert their head thereby terminating the eye exposure.

Elements

SCS1 designation for any device or bin in the library that can hold a cartridge. SCS1 elements include storage bins, tape drives, load port bins, and the picker.

EMI

Electro-Magnetic Interference refers to unwanted electrical noise present on a power line. This noise may leak from the power lines and affect equipment that isn't even connected to the power line. Such leakage is called a magnetic field. Magnetic fields are formed when unwanted noise voltages give rise to noise currents. Such noise signals may adversely affect electronic equipment and cause intermittent data problems.

ESD

Electrostatic Discharge

Host
The device or devices to which the library is connected.

IEC
The International Electrotechnical Commission is based in Geneva, Switzerland.

Load port
A port used to add a small number of tapes to the library without interrupting library functions.

LTO-2
Linear Tape-Open is a tape drive specification backed by HP, IBM and Seagate. Ultrium 460 tape drives (LTO-2) are HP's second generation of LTO tape drives.

LTO-3
Linear Tape-Open is a tape drive specification backed by HP, IBM and Seagate. Ultrium 960 tape drives (LTO-3) are HP's third generation of LTO tape drives.

LVD
Low Voltage Differential or LVD is a type of electrical signaling for parallel SCSI and can reach distances up to 12 meters. All SCSI HP Ultrium 460 tape drives are LVD devices. SDLT tape drives can be LVD or HVD devices.

MSBF
Mean Swaps Before Failure

MTBF
Mean Time Between Failures

MTTR
Mean Time To Repair

NEMA
National Electrical Manufacturers Association

Network interface Card (NIC)
A NIC is a device that handles communication between a device and other devices on a network.

NVRAM
Non-Volatile Random Access Memory is a type of memory that retains its contents when power is turned off. One type of NVRAM is SRAM that is made non-volatile by connecting it to a constant power source such as a battery. Another type of NVRAM uses EEPROM chips to save its contents when power is turned off. In this case, NVRAM is composed of a combination of SRAM and EEPROM chips.

PCI
The PCI bus typically runs at speeds of 33 MHz or 66 MHz and is usually 32 bits wide. This means that it passes 32 bits of data simultaneously as if down 32 separate wires. Some of the most recent computers include wider 64-bit PCI buses, and already certain very high-end video capture cards offer improved performance if connected to a 64-bit PCI bus.

Picker
A mechanical component of the extension axis assembly (robotics) which grips and holds a tape cartridge in transit

Robotics
As used in the context of automated tape libraries; the X-axis, Y-axis, and Z-axis mechanical assemblies inside the library used to move tape cartridges.

RS-232C
Short for Recommended Standard-232C, a standard interface approved by the Electronic Industries Association (EIA) for connecting serial devices. This standard is for asynchronous transfer between computer equipment and accessories. Data is transmitted bit by bit in a serial fashion. The RS-232 standard defines the function and use of all 25 pins of a DB-25 type connector.

SCSI
Small Computer System Interface. An American National Standards Institute (ANSI) communications standard for attaching peripheral equipment to computers.

SCSI ID
A unique address (0 to 15) assigned to each device on a SCSI bus.

SCSI-2
A second generation SCSI interface which includes command sets for magnetic and optical disks, tapes, printers, processors, CD-ROMs, scanners, medium changers, and communication devices.

SDLT
Super Digital Linear Tape is a Quantum tape drive and tape cartridge specification offered in three ranges of capacity and transfer rates for workgroup, mid-range, and enterprise needs.

SNMP
Short for *Simple Network Management Protocol*, a set of protocols for managing complex networks.

Take-up leader
The ring at the beginning of a tape in a cartridge.

Tape drive controllers
A device that controls the transfer of data from a host to a tape drive and vice versa.

Terabyte
A unit of measure for digital data equal to approximately 1,000 gigabytes, or 1,099,511,627,776 bytes!

Terminator
Special electrical resistors (terminators) are installed in the SCSI devices at each end of the SCSI bus and are **not** installed in other devices on the bus. The SCSI bus must be properly terminated at both ends so that commands and data can be transmitted to and from all devices on the bus.

Ultrium
See LTO-2

Index

A

ASCI 179
ASCQ 179
autharized reseller, HP 15
Autaclean 24, 179

B

back panel 19, 36
backup 32
bar code 53, 54, 55, 56
bit 179
byte 179

C

calibrate 179
capacity, starage 45
card cage 29
cartridge slats 36
check canditian status 179
CISPR 22 180
class 1 laser praduct 180
class 2 laser praduct 180
class A digital device 180
cleaning, tape drives 24, 104
climatic specificatians 110
canventians
  dacument 11
  equipment symbals 12
  text symbals 11

D

devices
  supparted 29
  traubleshooting 100
diagnastics 78
dacument
  canventians 11
  related dacumentatian 10

E

e2400-160 FC interface cantraller 29
e2400-FC 2GB interface cantraller 29
elements 180
EMI 180
enviranmental specificatians 110
equipment symbals 12
ESD 180
ESD precautians 48
Ethernet part
  LED indicatars 31
  lacatian af 31
external features
  e2400-160 FC interface cantraller 30
  e2400-FC 2GBB interface cantraller 30

F

FC cannectian, traubleshaating 99
FC interface cantraller e2400-160 29
FC interface cantraller e2400-FC 2GB 29
FC LED indicatars 32
features af FC interface cantraller, external 30
frant panel 18

G

getting help 15

H

HBA device driver, troubleshooting 101
help, obtaining 15
host 34, 181
host configuration, troubleshooting 101
HP
  authorized reseller 15
  storage web site 15
  technical support 15

I

identifiers, bar code 57
IEC 181
inserting tape cartridges 81
Interface Manager card 33
inventory 23

L

labels 53, 57
LAN-free backup and restore 32
LAN-free backup and restore, illustrated 33
LED
  link activity 92
  link speed 92
LED indicators
  defined 97
  Ethernet port 31
  FC 32
  power supply 31
  SCSI bus 32
  types of 97
left panel 36
library partitioning 45
library robotics 23
library, relocating 113
link activity LED 92
link speed LED 92
load port 45, 181
  DLT/SDLT 28
  LTO 28
  removable magazines 28
  tape cartridge magazines 28
load slots 36
LTO-2 181
LTO-3 181
LVD 181

M

magazines, removable 28, 45
media picker 23
messages, from library to host 139
mixed media 45
Model 630e 43, 44, 45
Model 712e 41, 42
moving the library 113
MSBF 181
MTBF 181
MTTR 181

N

NEMOT 181
NIC 181
NVRAM 181

O

OCP overview 65 to 66
off-line 63
on-line 63
optical scanner 23

P

panel
  back 19, 36
  front 18
  left 36
  right 36
  slots 36
partitioning 45

PCI 182
performance specifications 109
physical specifications 108
picker 23, 182
power
  off 63
  on 63
  supply, LED indicators 31
preserving tape cartridges 104

R

rack stability, warning 14
related documentation 10
reliability specifications 109
relocating the library 113
removable magazines 28, 45
restore 32
right panel 36
robotics 23, 182
robotics card 29
RS-232C 182

S

SAN 32
scanner, optical 23
SCSI 182
  bus configuration, troubleshooting 99
  bus LED indicators 32
SCSI devices, troubleshooting 100
SCSI ID 182
SCSI-2 182
SDLT 43, 44, 45, 182
sense data values
  asc 00 140
  asc 04 140
  asc 08 152
  asc 1A 149
  asc 20 144
  asc 21 144
  asc 24 144
  asc 25 145
  asc 26 145
  asc 28 151
  asc 29 151
  asc 2A 152
  asc 30 ?? to 146, 152 to ??
  asc 39 146
  asc 3A 150
  asc 3B 150
  asc 43 153
  asc 47 153
  asc 4E 150
  asc 53 146
  asc 5A 140
  asc 80 140 to 141
  asc 81 141
  asc 82 141
  asc 83 142
  asc 84 142
  asc 85 142
  asc 88 142
  asc 8A 151
  asc 8B 154
  asc 8C 143, 154
  asc 8E 143
serial port
  configuration, troubleshooting of 101
  location of 31
server 34
shipping restraint 116
slots 41, 42
  panel 36
  SDLT 43, 44, 45
SNMP 182
specifications
  climatic 110
  environmental 110
  performance 109
  physical 108
  power 110
  reliability 109
standby power button, location of 31
storage area network 32

starage capacity 45
starage elements 41, 42, 43, 44, 45
symbals in text 11
symbals an equipment 12

T

take-up leader 182
tape cartridges 81
  ESD precautians 53
  installing 60
  inventary 23
  labeling 53
  LTO Ultrium 25
  magazines 28
  maintaining 102
  preserving 104
  remaving 115
  SDLT 27
tape drive cantrallers 183
tape drives
  clean 24
  cleaning 104
  LTO Ultrium 25
technical suppart, HP 15
terabyte 183
terminatar 183
text symbals 11
traubleshaating 85 ta 91
  basic steps, listed 98
  devices, verifying 100
  FC cannectian, verifying 99
  FC interface cantraller prablems 97
  HBA device driver, verifying 101
  hast canfiguratian, verifying 101
  Interface Manager card prablems 92
  OCP prablems 87
  aperating prablems 90
  rabatics prablems 88
  SCSI bus canfiguratian 99
  SCSI devices, verifying 100
  serial part canfiguratian, verifying 101
  tape drive prablems 91

U

Ultrium 41, 42, 181

W

warning
  rack stability 14
  symbals an equipment 12
web sites
  Cammand View ESL 22, 34, 35, 40, 93
  HP starage 15